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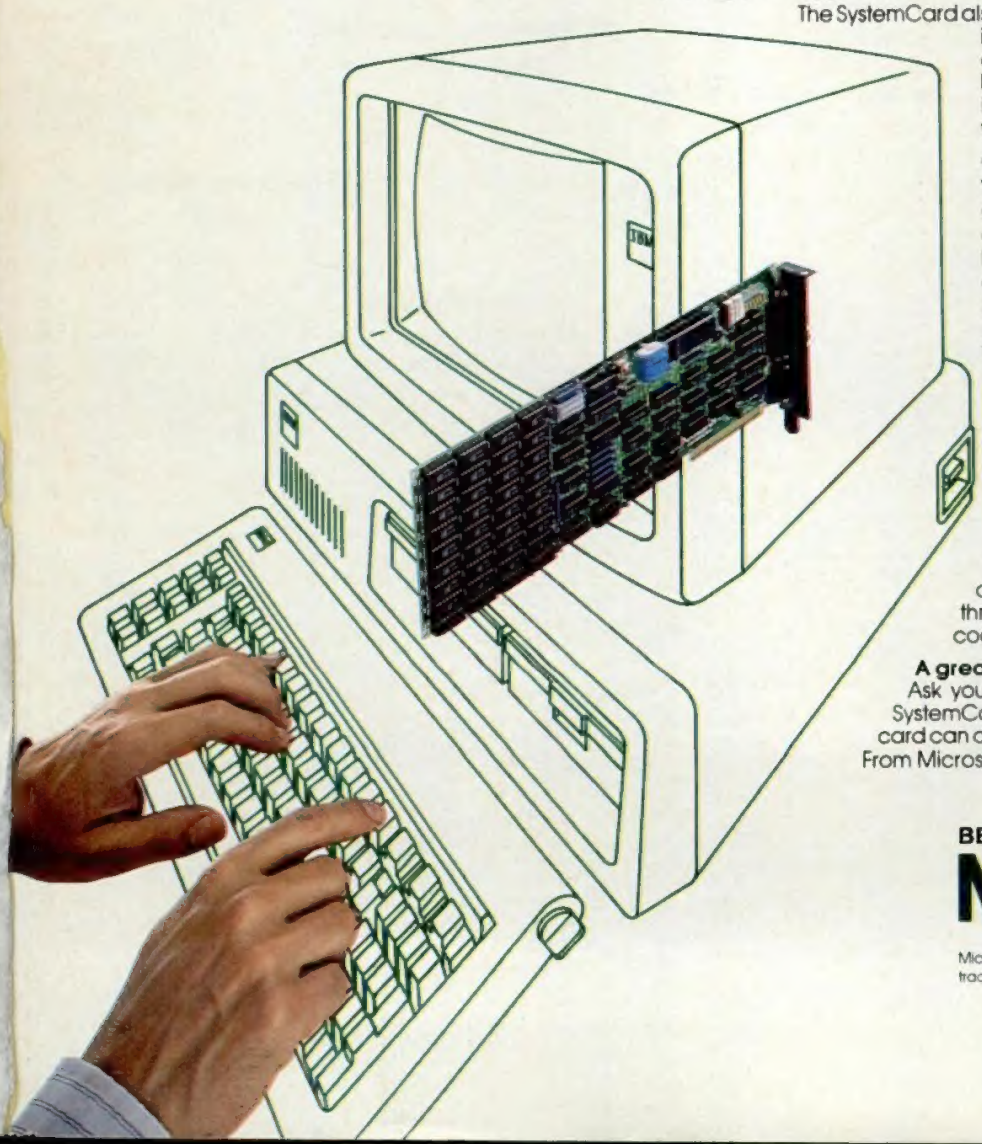

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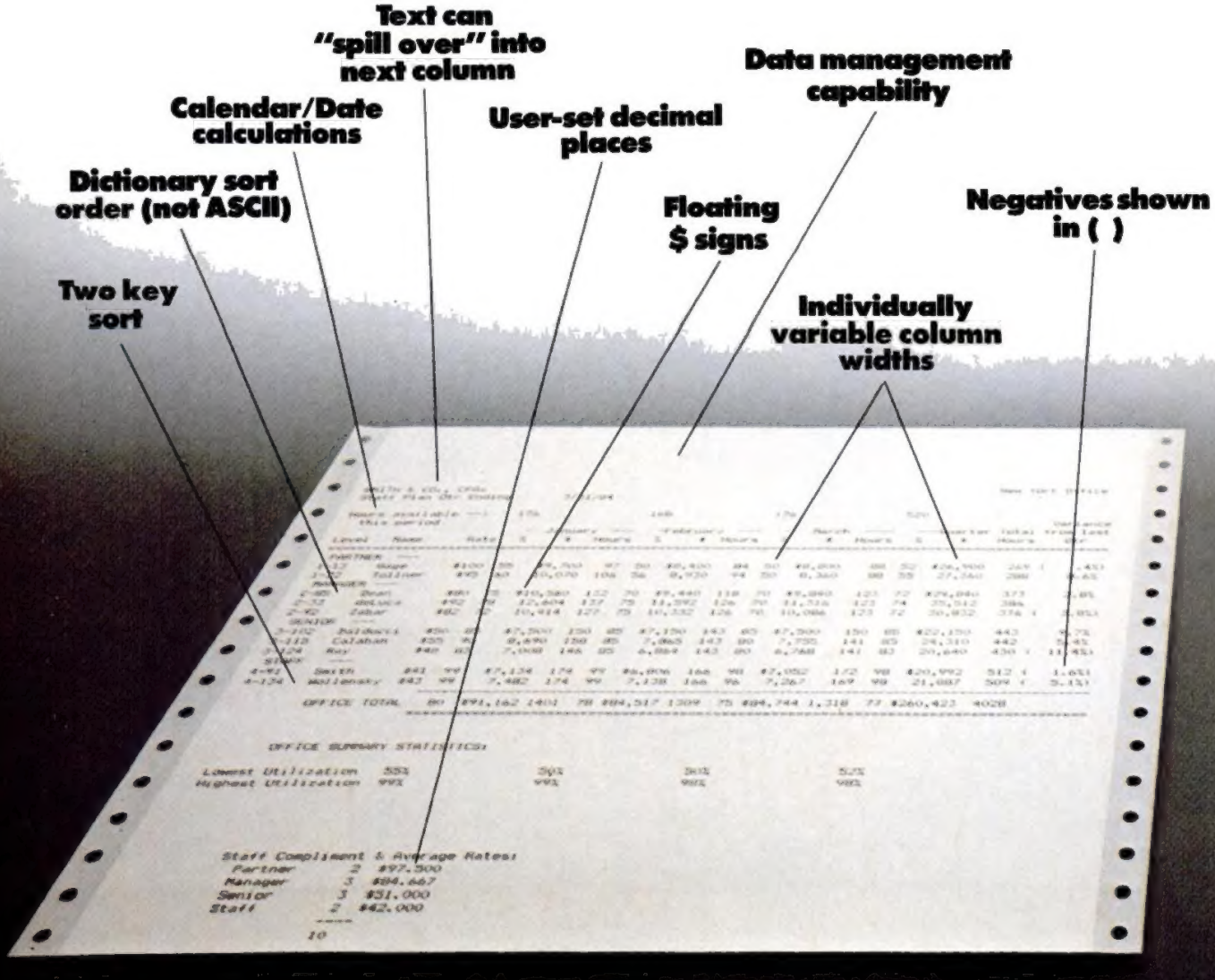

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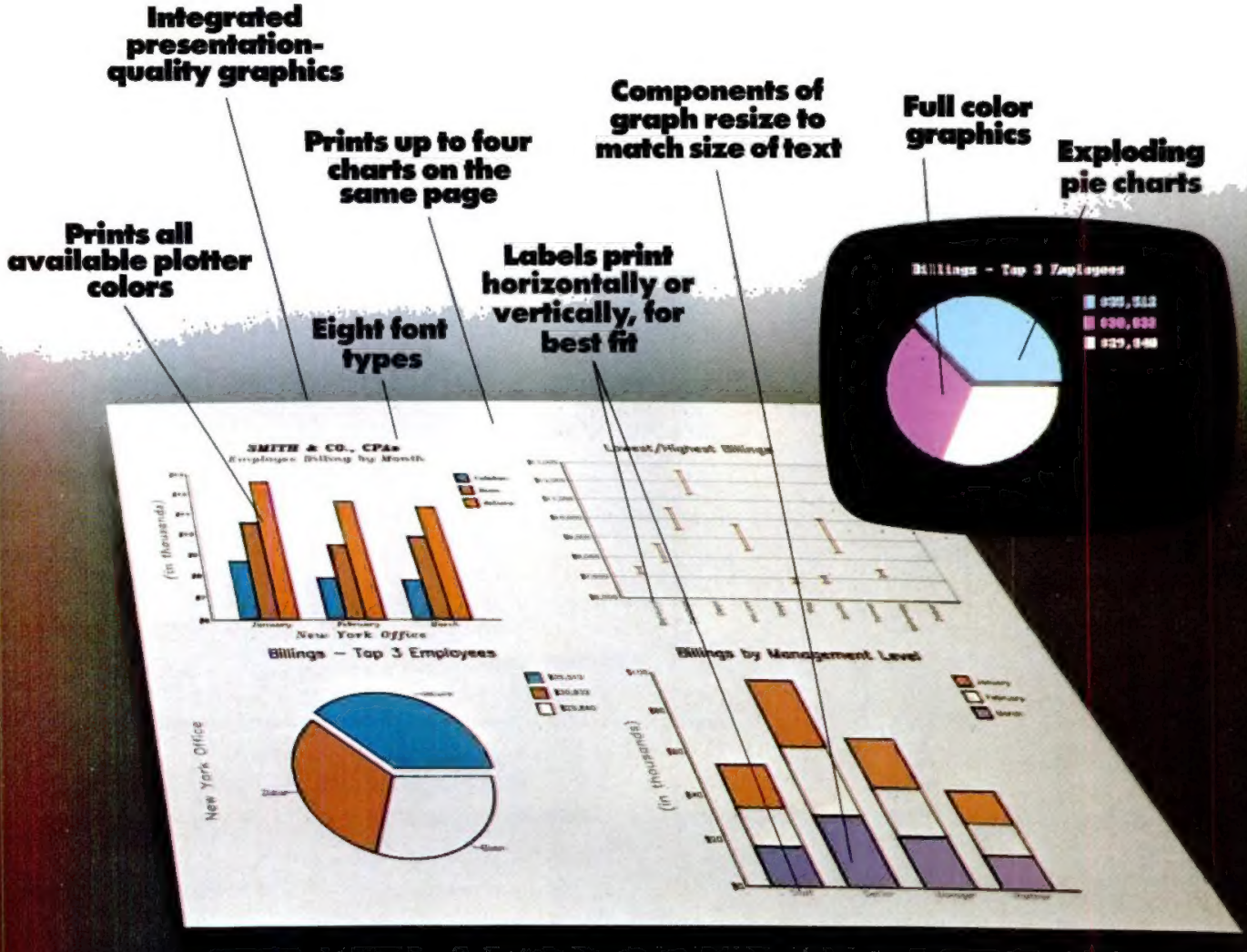

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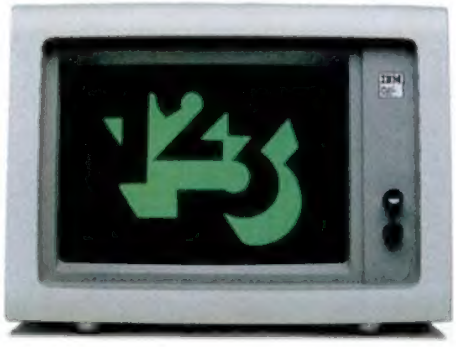

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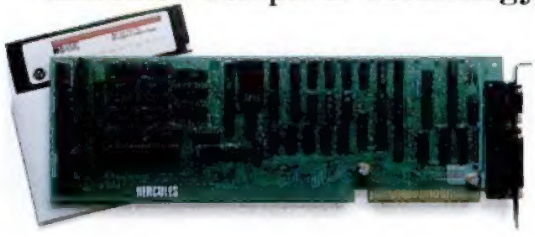

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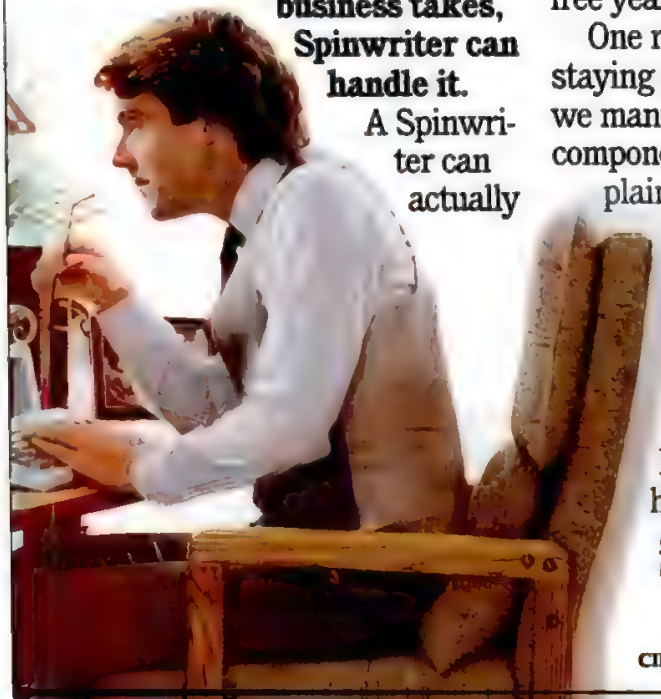

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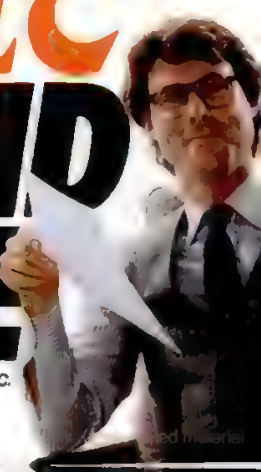

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It does all that without anyone here to help it. I just make up a list of things for it to do, and go home. Transporter does all the rest. It "wakes up" at the appropriate time, dials up other CROSSTALK or TRANSPORTER systems, and transfers the files I want. It can even dial up a remote printer, and print files for me. And it does it all with complete accuracy. When I come in the next morning, Transporter gives me a report of what it did, and at what time it did it.

I like it because it frees up my time during the day. The boss likes it because it saves on our phone bill. (The cleaning ladies are still trying to figure it out.)

Transporter — an exciting new idea in microcomputer communications from Microstuf, the creators of CROSSTALK. Ask your local dealer about it.

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1845 The Exchange
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The Communications Software People

For the IBM personal computer. Requires 96K RAM, two disk drives, PC-DOS, Hayes Microcomputer Products Stack Smartmodem or Smartmodem 1200, IBM Asynchronous communications interface, or equivalent RS232 interface. Communicates with any system running CROSSTALK, TRANSPORTER, or other compatible programs.

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TRANSPORTER™

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He wouldn't be in this mess if he'd known about DB TUTOR. He wouldn't have taken so long looking at complicated, and expensive, database packages. He'd have known that DB TUTOR teaches you all about databases, like DBASE II, 1-2-3, and more. Or that DB TUTOR assists in determining your individual database needs, then provides a database system, PC BASE, as an added bonus.

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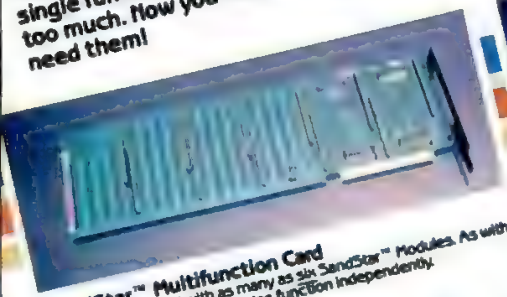
COMPLETE COMPATIBILITY
All SandStar™ Cards and Modules are designed to be 100% compatible with IBM hardware, operating systems, high level languages and diagnostics. They all come with a one-year repair or replacement warranty and are ready to ship.

PRICED RIGHT!
All SandStar™ Cards and Modules are competitively priced. In the long run, the SandStar™ Series will save you money.

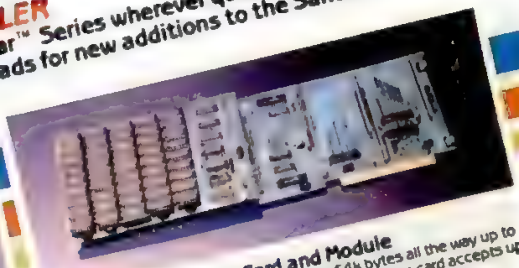
ASK YOUR DEALER
Look for the SandStar™ Series wherever quality computer products are sold. Watch our ads for new additions to the SandStar™ family.

SandStar™ Cards and Modules are the first IBM*-compatible peripherals engineered to be totally Modular. The ingenious design of the SandStar™ Series has virtually eliminated problems of board obsolescence and running out of expansion slots. Say good-bye to single function or "super" boards which either give you too little or too much. Now you can purchase the functions you need as you need them!

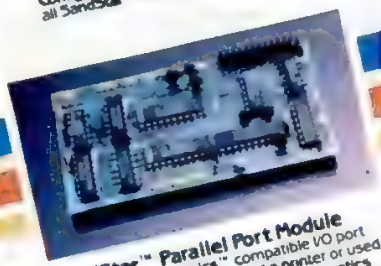


SandStar™ Multifunction Card
Configure your card with as many as six SandStar™ Modules. As with all SandStar™ Cards, all modules function independently.

SandStar™ 5¼"&8" Floppy Drive Controller Card
Control up to four 5¼" floppy drives or two 8" drives externally. This Card accepts up to three SandStar™ Modules.



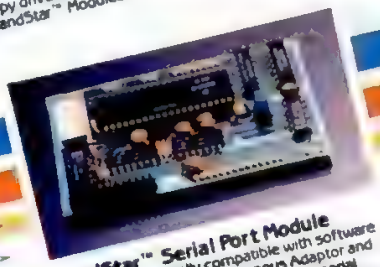
SandStar™ Memory Card and Module
Expand your total system memory from 64k bytes all the way up to 640k bytes using only one card slot. In addition, this card accepts up to three SandStar™ Modules. Includes StarDisk™ Software



SandStar™ Parallel Port Module
This port is a Centronics™ compatible I/O port which may be used to connect a printer or used as a general purpose I/O port. IBM diagnostics will run on this module.

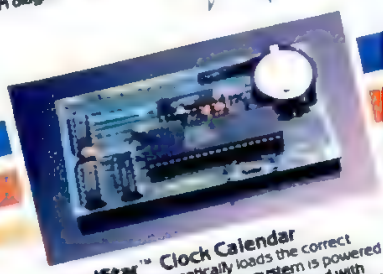
NEW!

SandStar™ SASI Host Adaptor Module
This module interfaces your PC to any SASI (or SCSI) compatible device such as the Xebec Hard Disk Controller



SandStar™ Serial Port Module
This module is totally compatible with software written for the IBM Asynchronous Adaptor and may be used to connect to a MODEM, serial printer or any device using a standard RS232-C interface. The port may be configured as Serial Port #1 or #2.

SandStar™ Hard Disk Controller Module
This module provides an interface between your IBM PC and the industry standard ST-506 type hard disk drives. Includes ECC (error checking and correcting).



SandStar™ Clock Calendar
This module automatically loads the correct time and date each time the system is powered up. The clock and calendar are equipped with battery back-up and run even when the power is turned off. Software included.

NEW!

SandStar™ Prototype Module
This module can be used to create prototype designs which can be installed in the IBM PC.

SandStar™ Game Adaptor Module
With this module you can attach up to four paddles or two joysticks. It may also be used with four digital inputs and four analog inputs for general purpose graphic applications. It uses the same type 15 pin "D" subminiature I/O connector as the IBM Game Control Adaptor.

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BiGraphix

the graphics board that works either way

BiGraphix I is unique. Until now, you could not perform graphics on your IBM Monochrome Display without having true compatibility. You can now do all this with one expansion slot with no additional software required.

BiGraphix II has all the features of BiGraphix I, but with an extended capability of 720 x 700 resolution on IBM Monochrome Display, and 640 x 400 in 16 colors.

ACP introduces BiGraphics I & II:
the graphics cards that will integrate your favorite Monochrome Display and software all with perfect compatibility.

With BiGraphics I you can:

run Lotus 1-2-3 graphics on your IBM Monochrome Display with no additional software;

run your IBM as either normal Monochrome Display or a graphics display;

perform graphics on an RGB monitor and a composite video monitor with a resolution of 640 x 200;

connect both RGB and IBM Monochrome Display simultaneously with either software or hardware switch selectable.

BiGraphix I also provides the convenience of a parallel printer port, has flicker-free scrolling, external switch for color or mono modes, and true DMA capabilities.

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Before you buy an IBM® XT, there is something you should know. An IBM® PC with a Davong hard disk is a better value. You can get more capability and capacity, higher disk throughput, easier upgrade, and better backup. All for less money.

You deserve better backup. Floppy backup just isn't adequate for large hard disks. Davong has optional tape cartridge backup systems for safe, secure, fast, high capacity backup of your files. (Tape backup available for both IBM PC and IBM XT.)

Do more, faster. A Davong hard disk with Multi-OS™ is up to three times faster than an IBM XT. Multi-OS gives you a real choice of operating systems by supporting DOS 1.1, DOS 2.0, CP/M-86™, Concurrent CP/M™, and Pascal. And extra features, like programmable disk cache, flexible volume mapping, and local area networking support, make your disk more useful.

Davong gives you more for a lot less money. And Davong hard disk systems are available, now, at more than 800 computer dealers.

DAVONG CHALLENGES THE IBM XT

	IBM XT	IBM PC & Davong hard disk
Capacity		
Capacity range	10–20 MB	5 to 128 MB
Upgrade unit capacities	10 MB	5,10,15, 21,32 MB
Features		
Backup	Floppy	18 MB tape cartridge & Floppy
Password protection	No	Yes
Flexible volume configuration	No	Yes
Local networking	No	Yes
Programmable disk cache	No	Yes
Throughput* (milliseconds/512 bytes)		
1000 sequential records:		
Write time	27	11.2
Read time	18.8	7.4
Random access	78.3	11.8 (with cache)
Price		
Suggested retail price		
Add-on 10 MB drive	$3390	$2395

*IBM DOS 2.0, IBM PC-XT vs. IBM PC with Davong Multi-OS

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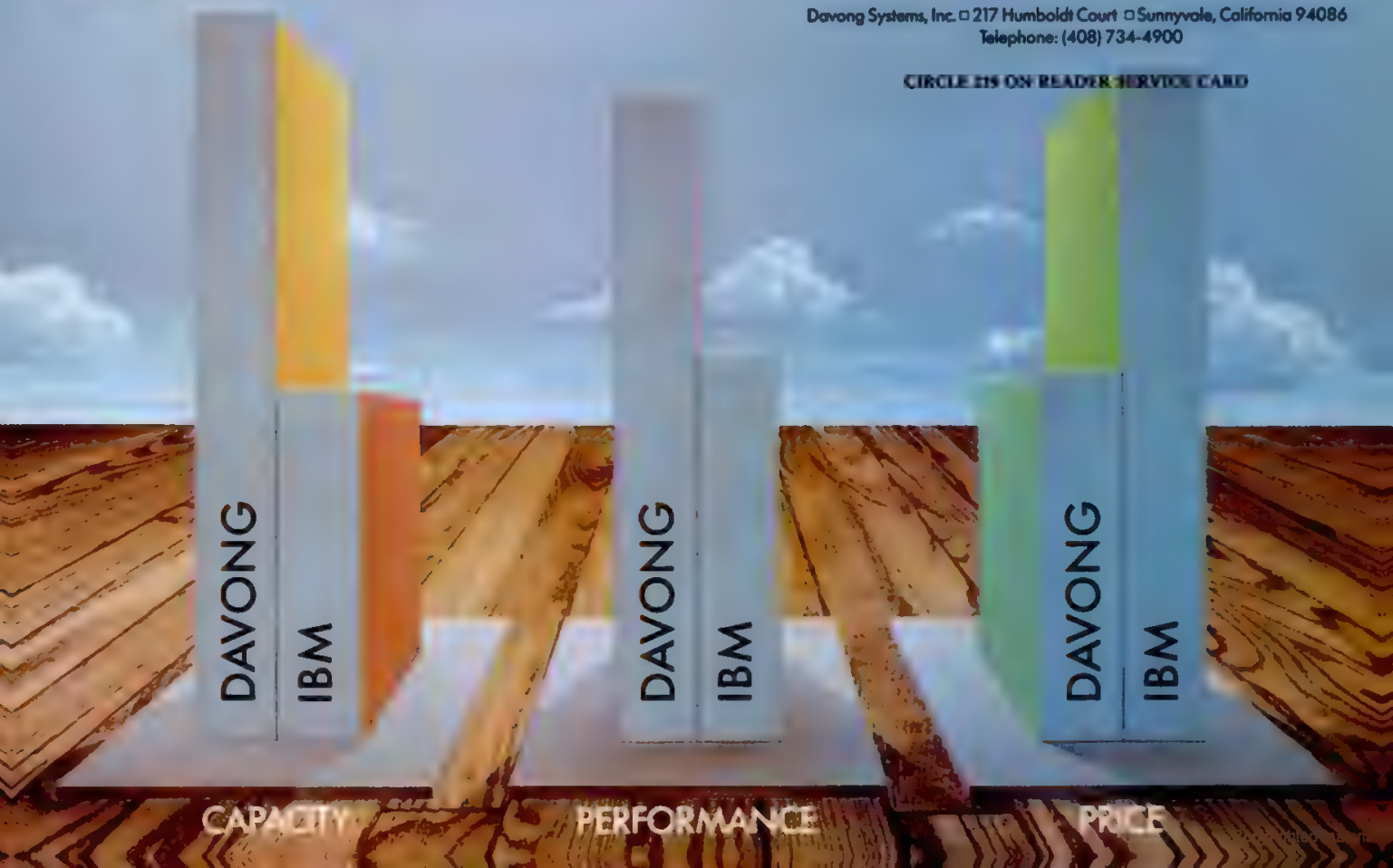

What's Inside

In its second biweekly issue, PC looks at dBASE II, the phenomenally successful database package that has spawned a whole new industry of software written in its language.

This month, *PC* covers one of the most stunning success stories in microcomputer history—Ashton-Tate's groundbreaking software, *dBASE II*. So influential has this relational database package become that it has expanded from a mere product into its own industry—a huge market for compatible products has grown up around it. Dozens of companies today are creating software that expands, alters, assists or otherwise ties into *dBASE II*. Even more significantly, products are now coming to market that use *dBASE II*'s commands as their control language. In effect, Ashton-Tate's application package is the first to also become a full-fledged computer language that other programmers can use to write their own applications software.

To encompass this story's *large* scope, *PC* has gathered articles that look at the many facets of *dBASE II* and its after market. Our cover section begins with a look at *dBASE II* itself, as systems consultant and *dBASE II* expert Glenn Hart takes us through the rudiments of the often confusing system and offers tips for getting the most from it. Bill Barker, a Texas *dBASE II* afficionado, compares its commands with those of BASIC.

Our cover package also looks at three types of products that have grown out of *dBASE II*'s success. Robin Webster, former editor of *Personal Computer Weekly* in England, examines program generators for *dBASE II*. James Graham, who edits *dNOTES*, a *dBASE II* users' newsletter, reviews graphics, statistical and other add-on packages that improve *dBASE II*'s performance. Finally, Don Layman, a Virginia writer who specializes in *dBASE II*, talks about the explosion of new applications software written in the *dBASE II* language.

We haven't left people out of our cover story package either. It features an interview with Wayne Ratliff, the creator of *dBASE II*; a profile of George Tate and the wildly successful company he helped create, Ashton-Tate; and visits with people in many fields who have used *dBASE II* to solve their real-life problems.

This month's cover indicates what lies ahead for *PC* now that we are coming to you 26 times a year. Each issue's cover will feature not a single article, but several pieces, so that we can cover important topics in greater depth and breadth than any other computer magazine. We have the space to spare for these "theme issues" because we are the largest consumer magazine ever published.

In addition to our *dBASE II* coverage, this issue of *PC* visits an Illinois bakery that uses computers to make lots of dough; and the studios of ABC-TV, where PCs are aiding all facets of production. We also review Logitech's mighty Mouse, Genie and Tecmar removable hard disks, and CP/M to DOS translation software packages. Readers who are dedicated word processors can check out a product as dedicated as they are—NBI's powerful word processing board for the PC. Plus, this month, we feature our new guest editorials and professional columns (Medicine, Law, Education, etc.), while PC News, our late breaking news magazine-within-a-magazine, makes its second bow.

We're excited about the new PC-26. We hope to now give you more every two weeks than you used to get every four. Let us know what you think. ■

Photograph: Ed Gallucci

THE WORLD'S BEST SELLING MULTIFUNCTION BOARD IS NOW EVEN BETTER

The new 384K Quadboard by Quadram is the most comprehensive board you can buy for the IBM PC or XT. Now with added hardware features and advanced software. But our same low price.

NEW EXPANDED QUADBOARD
Quadboard now delivers 9 of the most needed PC functions/features. To let you get the most out of your Personal Computer. And help you work better and faster.

All of these features are standard on the new Quadboard:

- **Parallel Port:** With the new Quadboard, you get a Parallel Port. Perfect for operating most printers and other peripherals.
- **Serial Port:** There's a Serial Port, too. Fully programmable, use it to connect to plotters, modems, and other serial devices.
- **Chronograph:** And Quadboard's Chronograph (Real-time clock/calendar) keeps your system's clock up-to-date.
- **Game Port:** The new Quadboard has an IBM compatible Game Port. Plug in a joystick or game paddles, and fire away.
- **I/O Bracket:** Quadboard now comes with a special I/O bracket. Use it to organize your expansion port connectors. Snaps right onto the back of the PC.

NEW

$295
Socketed with no RAM installed

QUADBOARD™

- **Expandable to 384K:** The new Quadboard is expandable in 64K increments for up to 384K additional RAM. With full parity checking standard. With the new Quadboard and a fully populated system board, you can take your PC's memory up to the 640K limit.
- **QuadRAM Drive:** Plus, with Quadboard you get advanced QuadMaster Software. Including the QuadRAM Drive program. Use it to set up multiple RAM Drives in Quadboard memory. Solid state drives that let you store and retrieve data quickly and easily. Or take advantage of QuadMaster disk caching. To access frequently used data whenever you need it.
- **MasterSpool:** QuadMaster Software also includes MasterSpool. Use it to set up a software print buffer quickly and easily. This advanced spooler lets you pause at any time, back up or move forward in a file. Choose just the amount of buffer space you need and stop waiting on your printer.
- **Qswap:** Another feature of QuadMaster Software is Qswap. With Qswap change line printers 1 and 2 back and forth, with just a few keystrokes, as often as you like.

QUADBOARD STANDS OUT FROM THE PACK

Now more than ever Quadboard is the first and only board your IBM PC or XT may ever need. No other board even comes close. Because Quadboard is designed for performance. Engineered for dependability.

And built in the continuing tradition of Quadram Quality.

There are many imitators, but only one leader. So make sure you ask for Quadboard by Quadram, the leader in micro-computer enhancement products.

QUADRAM QUALITY

Compare. See why more Quadboards are bought than any other multifunction board.

Features/ Functions	Quadboard	SixPakPlus
Memory Available	0-384K	0-384K
Parallel & Serial Port	Yes	Yes
Clock/ Calendar	Yes	Yes
I/O Bracket	Standard	Optional
Game Port	Standard	Optional
Diagnostic Testing	Yes	Yes
Advanced Spooler	Yes	No
Simple Menu Setup	Yes	No
Disk Cache	Yes	No
LIST PRICE WITH 384K*	$795	$970

*Manufacturer's suggested list price for board with all available features/functions as shown (options included). SixPakPlus is a trademark of AST Research Inc.

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BY QUADRAM™

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Introducing COMPAQ PLUS, the first high-performance portable personal computer.

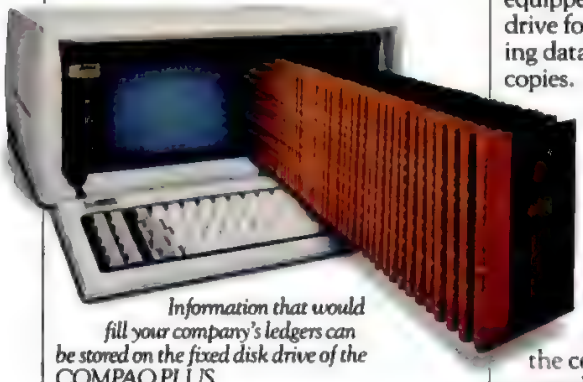
The makers of the COMPAQ™ Portable Computer, the industry standard, announce another breakthrough—the COMPAQ PLUS™ Portable Personal Computer. No other personal computer can handle so much information in so many places.

The new COMPAQ PLUS offers the power of an integrated ten-megabyte fixed disk drive in a portable. You get problem-solving power that no other personal computer can match.

Plus a bigger payload

How much is ten megabytes?

Enough to tackle jobs that can't be conveniently handled on most personal computers.



Information that would fill your company's ledgers can be stored on the fixed disk drive of the COMPAQ PLUS.

A mailing list of 100,000 names, addresses, cities, states, and Zip codes.

A full year of daily prices for every stock on the New York exchange.

Inventory records on a quarter million items.

The entire San Francisco phone book. And room left over for Peoria.

The fixed disk drive keeps all the information seconds away, ready to be searched, sorted, retrieved, analyzed or updated.

Plus better use of your time

The integrated fixed disk drive will store programs. That means your most used programs and data can be permanently kept in the COMPAQ PLUS, ready to call up and run.

With programs permanently stored, the COMPAQ PLUS becomes a well-informed traveling companion, a tool to help you apply your best thinking anytime, anywhere.

You could store a complete library of accounting programs on the disk—payables, receivables, general ledger, and payroll—*with* the company's books.

You could store an inventory control program with your inventory records and a list management program with your mailing list and a filing program with your personnel files.

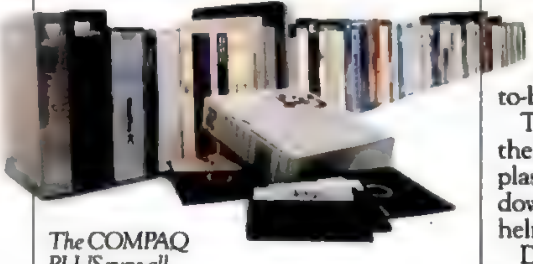
The COMPAQ PLUS is also equipped with a 360K byte diskette drive for entering new programs, copying data files, and making backup copies.

Plus more programs

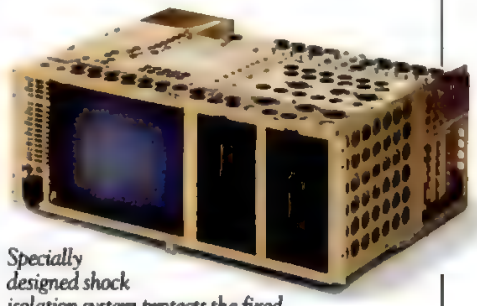
More programs means more versatility. And the COMPAQ PLUS is impressively versatile because it runs all the popular programs written for the IBM® Personal Computer XT, available in computer stores all over the country. And they run as is, with no modification whatsoever.

And the high-capacity portable multiplies the productivity of every program it runs. Your inventory and its control programs can go with you to the factory. Your books and your accounting programs can go with you to a board meeting. Your building specs and your project management programs can go with you to the construction site.

You're buying a computer to solve problems. Why not have more problem-solving programs to choose from?



The COMPAQ PLUS runs all the popular programs written for the IBM Personal Computer XT.



Specially designed shock isolation system protects the fixed disk from jolts.

Plus a traveler's toughness

Life can be tough on the road. A true portable has got to be tougher. The COMPAQ PLUS is.

Its integrated fixed disk drive is unique, designed specifically to travel. Rough roads and hard landings don't bother it because of a specially designed shock isolation system that protects the disk from jolts and vibration.

All the working components are surrounded by a uniquely cross-membered aluminum frame. This structure, common in race car design technology, strengthens it side-to-side, front-to-back, and top-to-bottom.

The outer case is made of LEXAN®, the same high-impact polycarbonate plastic used to make bulletproof windows and faceplates for space suit helmets.

Does a portable personal computer really have to be this tough? Take a good look at your briefcase and then decide.

Plus ease of use

The COMPAQ PLUS is big where it counts.

The display screen is big. Nine inches diagonally. Big enough to show a full 25-line-by-80-character page that's easy to read even if you're leaning back in your chair.

The keyboard is full-sized and typewriter-style for easy control.

With its built-in display, the COMPAQ PLUS makes a smooth, low profile on your desk, not an obstacle that you have to talk around.

Plus an easy way to get started

If you're buying your first personal computer and you're not sure how much capacity you need, your choice is easier now.

Start with the COMPAQ Portable with single or double 320K byte diskette drives. If you need more capacity later, upgrade to the COMPAQ PLUS. A conversion kit is available that turns the COMPAQ Portable into a COMPAQ PLUS, complete in every detail and capability.

Plus a lot more

The COMPAQ PLUS also works with optional printers, plotters, and communications devices designed for IBM's personal computer family.

It has two IBM-compatible slots for adding optional expansion boards. With companion programs, they'll let you share information with a network of personal computers in your office, communicate with your headquarters computer files while you're away, or add memory capacity if your needs grow.

The COMPAQ Portable, the industry standard in portable personal computers. ▼

The problem-solving power of a high-performance desktop personal computer can now go where you need it.

It's got high-resolution graphics and text on the same screen. A detached keyboard. Programmable function keys. Expandable memory. Dozens of other features that simply make it do a better job of personal computing.

And when you see all that the COMPAQ PLUS has to offer, you'll be pleasantly surprised by the price. The fact is, it costs hundreds less than comparably equipped desktop personal computers.

See the first high-performance portable personal computer. The COMPAQ PLUS—performance, programs, productivity. Plus problem-solving power.

The new COMPAQ PLUS, the first high-performance portable personal computer. ▼

COMPAQ PLUS Specifications

Storage

- ☐ One integrated 10-megabyte fixed disk drive
- ☐ One 360K byte diskette drive.

Software
- ☐ Runs all the popular programs written for the IBM XT.

Memory
- ☐ 128K bytes RAM, expandable to 640K bytes

Display
- ☐ 9-inch diagonal monochrome screen
- ☐ 25 lines by 80 characters
- ☐ Upper- and lowercase high-resolution text characters
- ☐ High-resolution graphics

Interfaces
- ☐ Parallel printer interface
- ☐ RGB color monitor interface
- ☐ Composite video monitor interface
- ☐ RF modulator interface

Expansion board slots
- ☐ Two IBM-compatible slots

Physical specifications
- ☐ Totally self-contained and portable
- ☐ 20"W × 8½"H × 16"D

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MOST ACCOUNTING SOFTWARE TURNS WORK STATIONS INTO BATTLE STATIONS.

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Other software dealers will tell you what they *think* their product will do. Only Champion dealers will *show* you how the software performs.

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"It performs extremely well...If you are looking for a good, competitively priced, fully integrated accounting package...take a close look at this one."
Amanda Hixson
INFOWORLD, 9 83

"...users will find this to be a very comprehensive software package with several attractive features that make it superior to its competition."
Carl Heinz, CPA
INTERFACE AGE, 8 83

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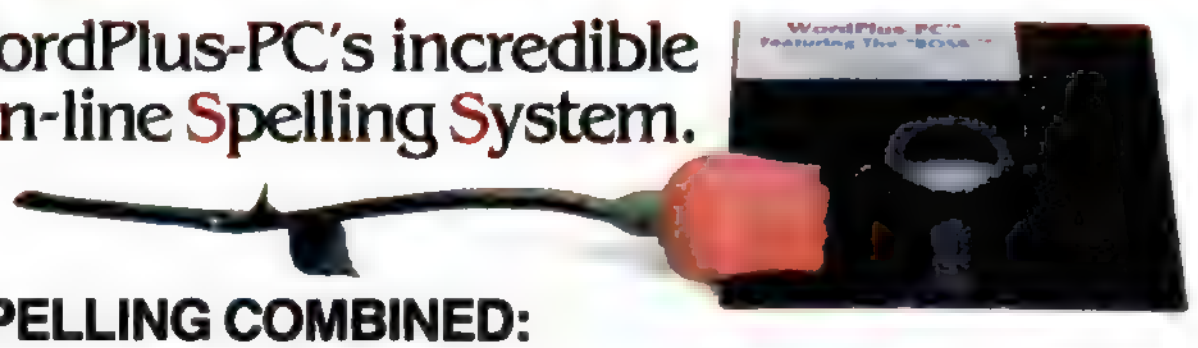
WordPlus-PC™ featuring the BOSS™. Word processing so smart it can even spell 100,000* words.

Meet the BOSS. WordPlus-PC's incredible new Built-in On-line Spelling System.



WORD PROCESSING AND SPELLING COMBINED:

WordPlus-PC featuring the "BOSS" is a whole new technology in word processing software. Finally, the most powerful word processing capabilities have been combined with a built-in electronic spelling system which not only *checks your spelling* but also *corrects your spelling.*

The "BOSS", an acronym for Built-in On-line Spelling System, eliminates embarrassing spelling errors in your letters and stops time consuming trips to the dictionary.

But WordPlus-PC featuring The "BOSS" will do far more than just check and correct your spelling. It's been designed to be exceptionally easy to use and yet contain all the powerful features you expect and more. Like built-in mail merge for personalized form letters, invoice generation and the ability to merge information created by most other popular programs such as 1-2-3™ and dBASE II.™ And if you have a question, just press the HELP key to get back on track.

You can also print bar graphs and other charts,** easily move columns, scroll horizontally, execute global search and replace, boilerplate text, and even print proportionally spaced on selected printers. And WordPlus-PC is compatible with virtually all popular letter-quality and dot matrix printers.

*With 90,000+ word standard dictionary and ability for a user to add over 10,000 "custom" words.

HERE'S HOW THE BOSS WORKS FOR YOU:

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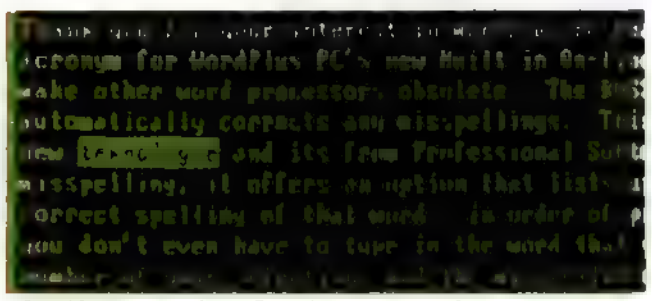
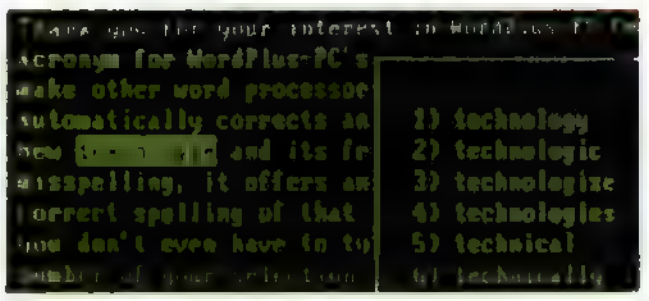


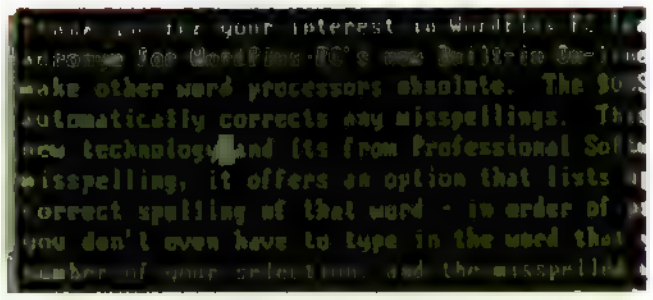
At the touch of a button, virtually anytime during typing or after the creation of a document, The "BOSS" locates and *highlights misspelled words* on your screen. The "BOSS" can even check the spelling of a word directly after it's been typed in.

IT SUGGESTS



When a word is misspelled, the user can ask The "BOSS" for suggestions as to how to correctly spell the word. With only one keystroke, The "BOSS" will display, in a dynamic on-screen window, up to eight *spelling suggestions in the order of probable phonetic correctness.*

IT CORRECTS



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This system can run most of the same software and accept most of the same IBM hardware as the computer on the right. And its price/performance is nothing less than remarkable.

The IBM Personal Computer

which is which.

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And by adding an expansion unit with a *second* 10-megabyte fixed disk drive, you get even more high-volume capacity from the system. XT can run most of the same software and accept most of the same IBM hardware as the computer on the left. And its price/performance is nothing less than remarkable.

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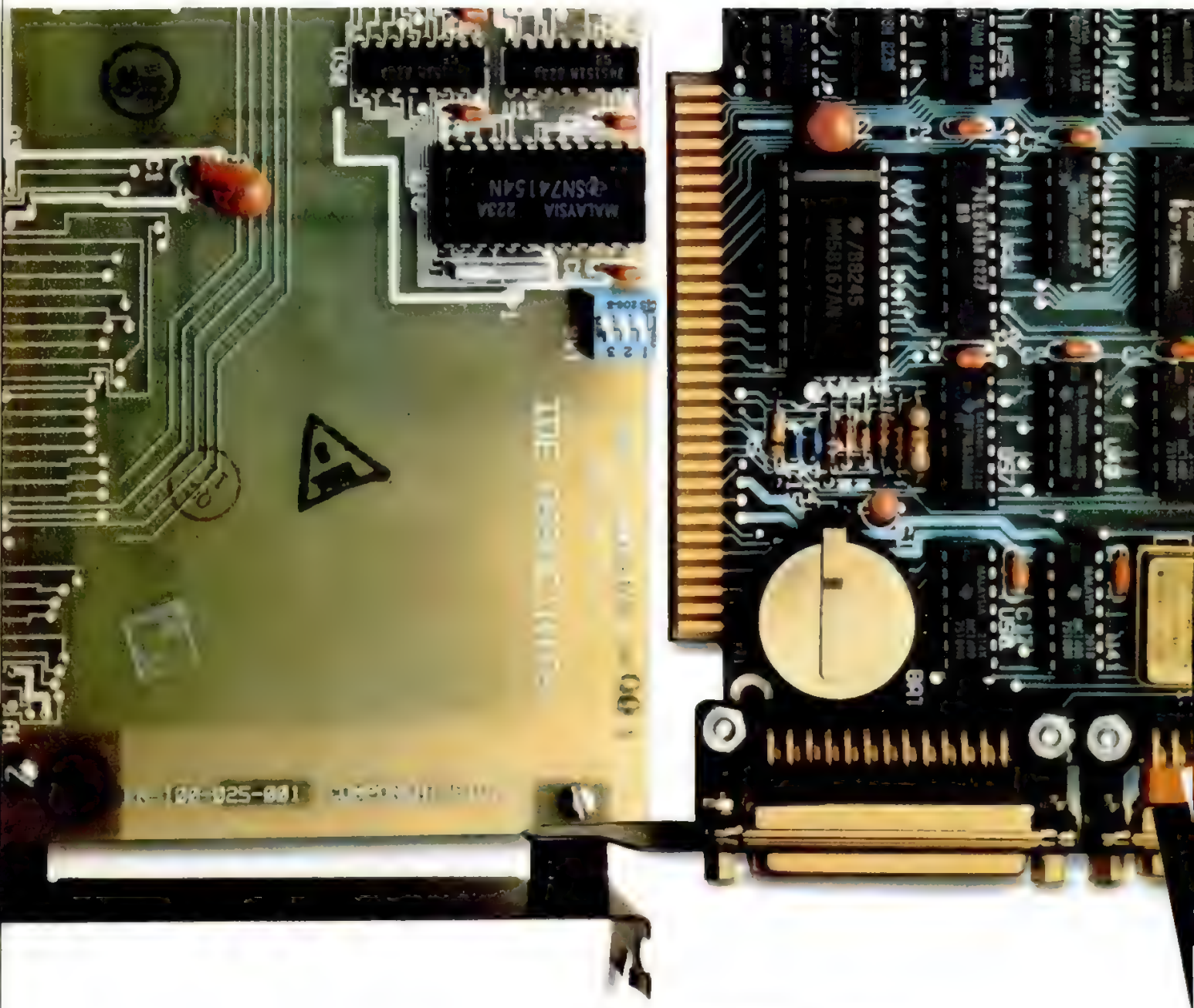

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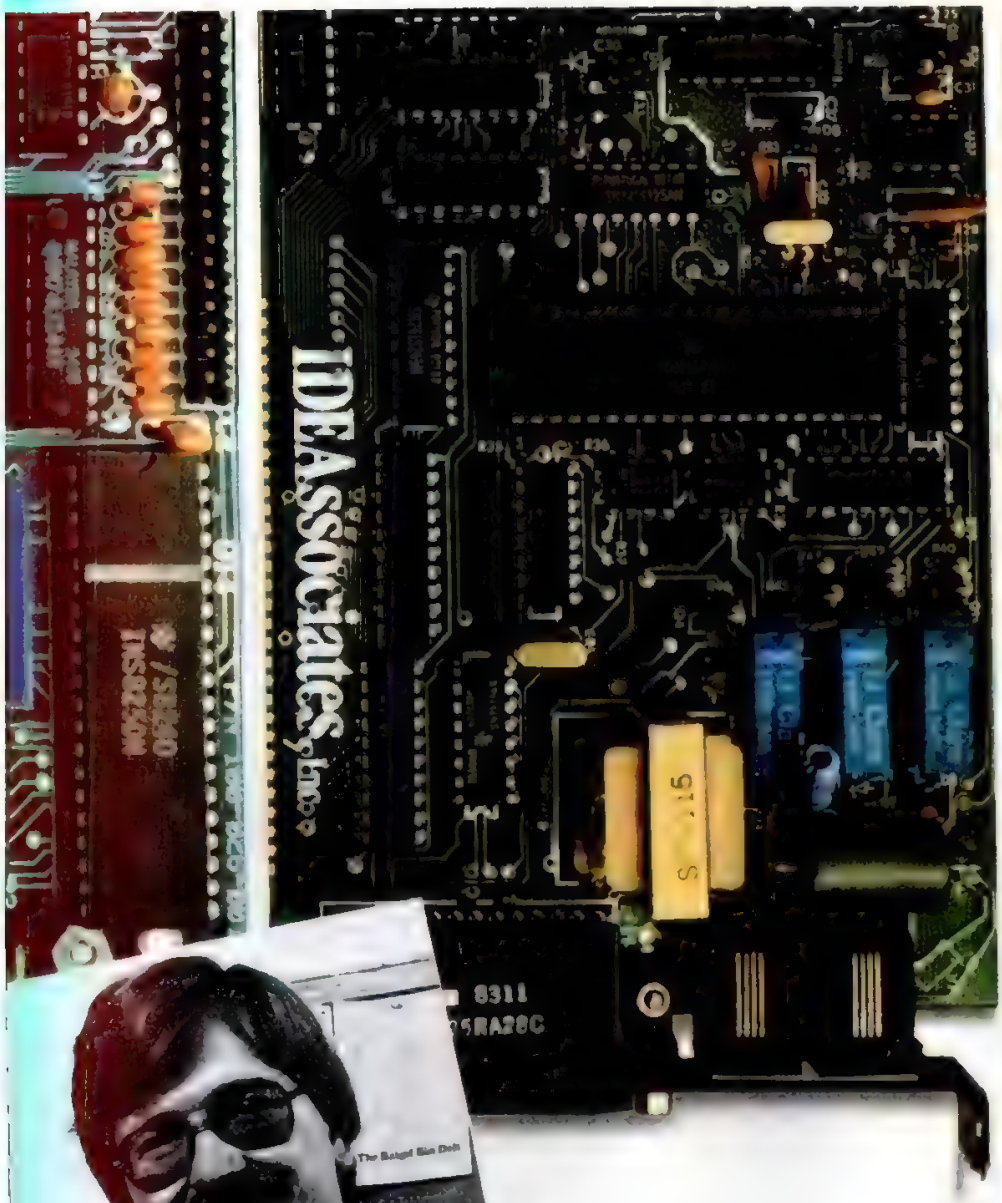

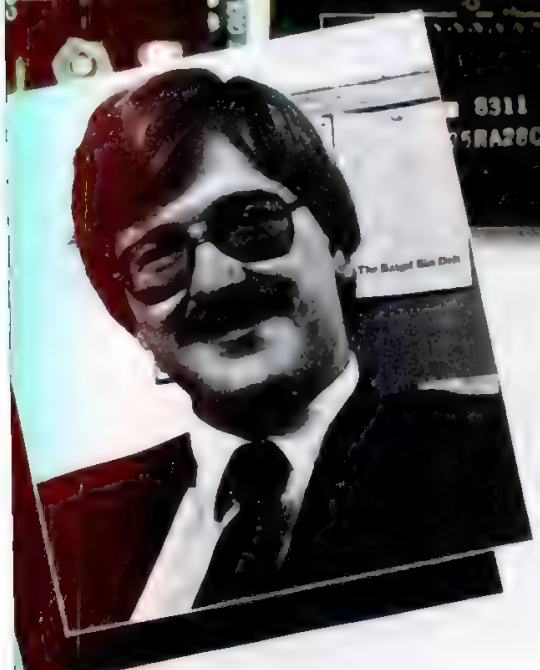

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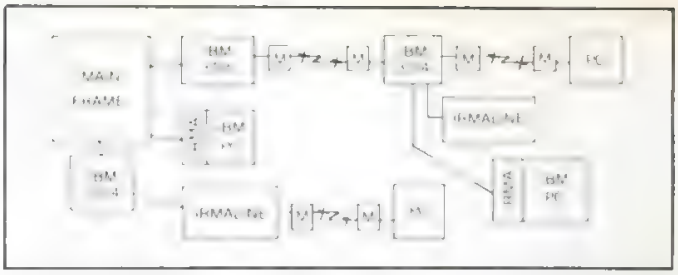

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Trends and Developments of IBM Personal Computers

IH News

FROM THE EDITORS OF PC

FEBRUARY 7, 1984

New Tandy Tack: IBM Compatibility

Strong retailer spiffs up image; goes after big business user with new models

BY KAREN COOK

FORT WORTH—For years, Tandy Corporation has been the microcomputer industry's leading outsider, steadfastly clinging to its own Radio Shack retail network to sell its single-user computers and outfitting them with a proprietary operating system, TRS-DOS. Now, in a push to build up its sagging computer market share, Tandy has introduced an IBM-compatible computer: the Tandy TRS-80 Model 2000.

The Model 2000 improves on the PC in several ways, Tandy says: It has the next generation Intel 80186, a chip with a 16-bit data bus that runs twice as fast as IBM's 8-bit 8088; its floppy disk storage capacity and standard RAM are larger; and the optional color displays have higher resolution (up to 640x400 pixels) in a choice of 16 colors.

Finally, Tandy claims, the Model 2000 costs less: with two drives, monochrome monitor, 128K, two ports, and MS-DOS 2.0, the Model 2000 at $2,999 is $659 cheaper than a comparably equipped PC. (Without the monitor, the Model 2000 costs $2,750.)

Although Tandy/Radio Shack's lap-size Model 100 is popular with traveling executives, Tandy Corporation's marketing experts believe that consumers associate the Radio Shack label with low-level electronics supplies, rather than sophisticated hardware. In an attempt to disassociate the new computer from what it calls Radio Shack's "consumer image," Tandy Corporation introduced the Model 2000 with the more serious "Tandy" prefix.

The company will retain the TRS label for the Model 2000, however, even though it is popularly pronounced "TRaSh." "The Model 2000 is part of the TRS family, and that has a fair reputation," says Ed Juge, director of merchandising for business computer products. "The

Tandy is betting on its Model 2000 personal computer.

The New Wave of Japanese PCs

By focusing on standard 16-bit computers and MS-DOS, Japanese find wedge into U.S.

KAREN COOK AND MARTY PORTER

NEW YORK—"The Japanese are finally going to make a dent in the microcomputer marketplace this year," says Ken Sonenclar, program director for the Stamford, Connecticut-based Gartner Group, a computer technology consulting firm. The current rush of 16-bit Japanese machines comes more than 5 years after Apple introduced its first microcomputer and 2½ years after IBM brought out its original PC.

In general, the new Japanese computers are less expensive than IBM's PC and its American-made compatible competitors—and they are sure to be heavily promoted. "Most of the Japanese companies are a lot

Tandy *(continued)*

"trash" nickname doesn't bother us at all—it's something the competition hung on us, and it shows they know we're here."

Tandy's image-polishing is largely aimed at improving its chances for corporate sales. The company depends entirely on its network of 1100 Radio Shack stores, however: Although some outlets do send representatives to work with businesses, Tandy has no direct sales force. The retail stores provide all continuing service as well.

The switch to MS-DOS gives the Model 2000 a major advantage over the TRS Model 16, the multi-user business-oriented computer that Radio Shack introduced last year. That computer hasn't sold well, Radio Shack admits, largely because there isn't enough software available for that machine's XENIX multi-user operating system.

The Model 2000 has an independent hardware identity, and cannot share expansion cards or peripherals with IBM. All Tandy has done is adopt IBM's principal operating system. As Houston-based Compaq Computer Corporation's president Rod Canion commented when he introduced the company's IBM XT-compatible last summer, "IBM, perhaps inadvertently, has already made MS-DOS the standard for the industry. If IBM introduced another system, even it would have to hold its own against the established base of MS-DOS software." By implementing Microsoft's operating system, Tandy has not made another PC clone—it has simply offered its customers access to the wide selection of software that is MS-DOS-based rather than PC-specific.

Tandy's Model 2000 can read IBM's 320K disks, but cannot write to them directly—IBM program information must be copied to the 720K format. Once that has been done, product manager Don White says, the Model 2000 will run any program that does not address IBM's proprietary hardware directly—probably more than 50 percent of available software.

Since they interact directly with IBM's architecture, big-selling financial programs like Lotus' *1-2-3*, *VisiCalc*, and *SuperCalc* will not run on the Model 2000. Wordstar, initially on the incompatible list, has since been tested and runs "like a gem," White says. Some currently incompatible programs could be issued for the Model 2000 with "usually minor" code changes by the manufacturer, White adds. While such alteration would give Tandy owners new products, they wouldn't help people who already owned the IBM PC software.

Although it has an agreement to offer the Arcnet local area network from minicomputer maker Datapoint (San Antonio, Texas) for its Model 12 and Model 16 computers, Tandy has yet to offer any networking or mainframe communications packages for the Model 2000's business customers. New capabilities are in the works, however. "As they become available, we'll announce them," product manager White says. ■

New Wave *(continued)*

bigger than American look-alike manufacturers, and they're going to be able to put a lot of bucks into advertising and marketing," Sonnenclar says.

Does this mean the Japanese will be able to price American companies out of the market, as they did with their televisions and stereos in past decades? "There could be price cutting eventually, even by IBM if necessary. But there's no need for price cutting now—the market is growing so fast there is plenty of room for everybody," adds the Gartner analyst.

Sperry is going after the corporate IBM compatible market with a PC that's made in Japan.

The stage for the Japanese invasion of the U.S. market has been set by the IBM PC embrace of MS-DOS as the predominant operating system for the U.S. computer market. "The Japanese are very good at long production runs of standard-type devices, and all the pieces are falling into place for that," says Sonenclar, adding that American PC-compatible manufacturers may have trouble realizing the same economies of scale.

"The IBM standard made it much easier for the Japanese to enter the market," comments Ben Rosen, a partner in the Sevin-Rosen venture capital firm and the chairman and chief fundraiser for Houston's Compaq Computer Corporation, probably the leading IBM-compatible manufacturer. "Two years from now, 90 percent of the market will consist of people producing computers to meet IBM standards."

Until recently, U.S. software requirements have presented a major obstacle for the Japanese. The Japanese are skilled at hardware design but less adept at software development.

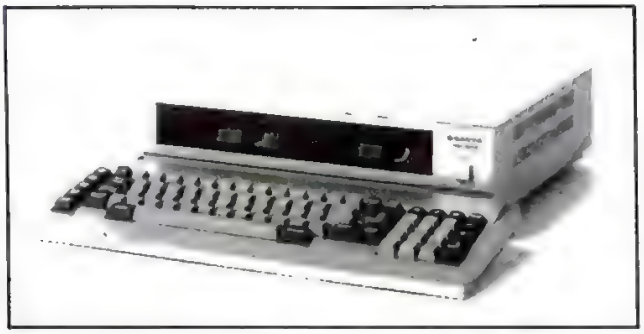
To add to the problem, Japanese software packages are written for specific computers and customized to meet particular professional or industrial requirements. In the United States, software is designed to operate on a wide range of machines, and it is up to users to adapt software to their own needs. Not surprisingly, the generalized software aimed at the American market costs a lot less than do specialized programs in Japan.

Because of the increasing variety of software available

for MS-DOS, Japanese companies will be able to tap into an immediate supply of American software without confronting the intricacies of program design. Unlike IBM, the Japanese are selling computer systems bundled with several software packages included in the list price. For many consumers, that may be a big selling point. When the Matsushita Electric, Inc.-owned Panasonic company unveiled its Senior Partner portable at COMDEX last fall, it threw in nearly $1,500 worth of software, including GWBASIC, *WordStar*, *VisiCalc*, *pfs:Graph*, *pfs:File*, and *pfs:Report*.

Selling computers in the United States has presented additional problems for the Japanese: Unlike TVs or radios, computers require a strong network of well-informed dealers, which is expensive and time-consuming to build up. Even more difficult is gaining entry to the large corporations—the corporate marketplace. "You need a direct salesforce to go in and talk to a high-level data processing manager, and so far the only company that has been able to do that is IBM," comments Sonenclar. He doesn't expect the Japanese will have much impact in big business.

One company that may have found a viable way into America's boardrooms is Mitsubishi Electronics, which has the contract to develop and manufacture the Sperry Corporation's new Sperry PC. Thanks to Mitsubishi's low-cost manufacturing, Sperry can offer bit-level IBM PC-compatibility and an 8088-2 microprocessor that runs many programs twice as fast as IBM's standard 8088, Sperry says, and at 10 percent less than the original PC. With those advantages, plus a well-known and widely respected name, Sperry—and Mitsubishi—hope the new PC will pick up market share quickly.



Sanyo is taking on both the PC and the PCjr with bargain prices on its IBM lookalike systems.

Fujitsu has jumped on the MS-DOS bandwagon with a $200 add-on for its Micro 16s Personal Computer.

The new PC represents Sperry's first agreement with a subcontractor and its first foray into the mass market. Sperry is new to the rough-and-tumble world of consumer retailing that the Japanese know so well, but it does have 1300 direct sales representatives and 15,000 mainframe computers installed worldwide. The Sperry PC can emulate either IBM 3270 or Sperry Uniscope-type mainframe terminals; it uses *Crosstalk* and other communications programs allowing users to link their computers with public and private databases. That versatility should make MIS (Management Information Systems) directors happy.

The Sperry PC comes in seven configurations, each including a monitor, system unit, Key tronic keyboard, 128K, RAM, MS-DOS, GWBASIC, and the 8088-2 microprocessor. The cheapest, a $2,643 Sperry PC Model 10, has one diskette drive and a monochrome display. At the high end, for $5,733, Sperry's Model 50 has a hard disk, diskette drive, and, most important, an enhanced color monitor that offers four grades of resolution and 256 colors.

Taking a tack similar to Mitsubishi's, Seiko-K, Hattori & Company, Ltd. entered into a joint venture with Bridgewater, New Jersey's Science Management Corporation (SMC) to form SMC Seicom, the U.S. marketing arm for Seiko's computers. According to Richard Wilson, SMC Seicom's marketing director, Seiko was "the first company in Japan to use the Intel 4004, the first microchip." It also owns Epson America, Inc., best known in the United States for low-cost printers especially on the IBM PC.

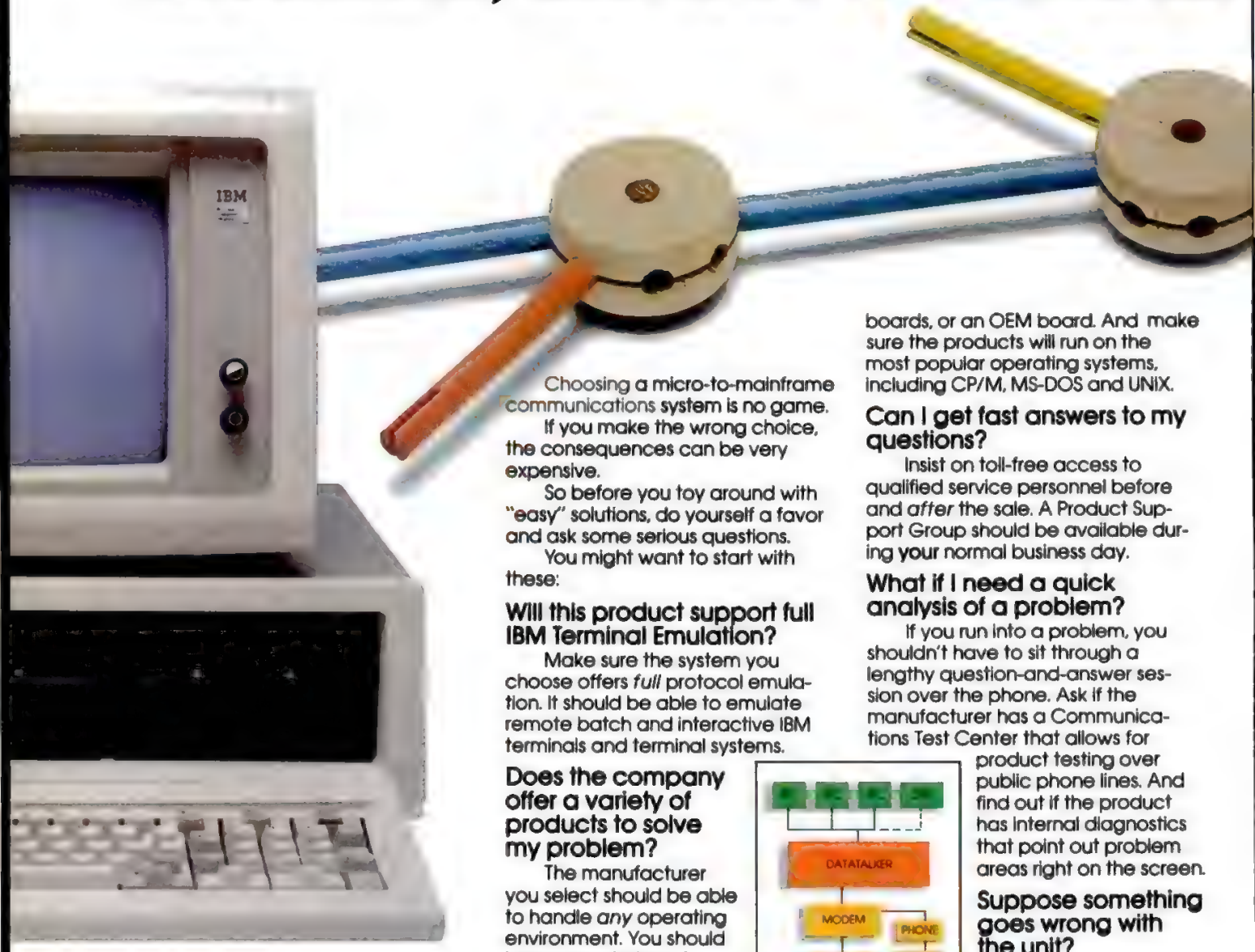
SMC has been involved in management and technology consulting and developed business applications software for some 35 small-computer manufacturers.

Wilson believes that the joint venture benefits both companies. Seiko supplies computers and its widely recognized brand name; SMC supplies specifications for the machines, software, some peripherals, and marketing expertise.

According to Wilson, Seiko's Series 8600 computer is targeted for small businesses that need multi-user computers. With six optional operating systems, including MS-DOS, the Seiko is "operating system-compatible, media-compatible, and over 50 percent program-compatible with the IBM PC," Wilson says. Series 8600 prices range from $5,415 to $15,000.

Micro-to-mainframe:

Before you settle for solution, ask a few serious



Choosing a micro-to-mainframe communications system is no game.

If you make the wrong choice, the consequences can be very expensive.

So before you toy around with "easy" solutions, do yourself a favor and ask some serious questions.

You might want to start with these:

Will this product support full IBM Terminal Emulation?

Make sure the system you choose offers *full* protocol emulation. It should be able to emulate remote batch and interactive IBM terminals and terminal systems.

Does the company offer a variety of products to solve my problem?

The manufacturer you select should be able to handle *any* operating environment. You should have your choice of stand-alone front-end processors, IBM PC or XT boards, or an OEM board. And make sure the products will run on the most popular operating systems, including CP/M, MS-DOS and UNIX.

Can I get fast answers to my questions?

Insist on toll-free access to qualified service personnel before and *after* the sale. A Product Support Group should be available during your normal business day.

What if I need a quick analysis of a problem?

If you run into a problem, you shouldn't have to sit through a lengthy question-and-answer session over the phone. Ask if the manufacturer has a Communications Test Center that allows for product testing over public phone lines. And find out if the product has internal diagnostics that point out problem areas right on the screen.

Suppose something goes wrong with the unit?

Be sure the company offers a service plan that includes a 30 day money-back guarantee and a 12 month warranty that includes a free replacement unit.

a simplistic questions.

What about future product development?

It's not enough for a company to solve your communications problems today. Ask about their commitment to R&D. Are they working on products you're going to need soon? If not, you might want to consider someone who is.

Who am I dealing with anyway?

In a market as volatile as this one, you need some reassurance that the people you buy from will be around to back up their products. Ask how long they've been in business. The longer, the better.

How much is all this going to cost?

There are lots of micro-to-mainframe solutions with lots of price tags. But here's a point of reference for you:

Our own DataTalker™ product line will give you all the capabilities and services we've just described for as little as $695. Complete.

Granted, this isn't all the information you'll need to choose the right micro-to-mainframe solution. But it's a good start.

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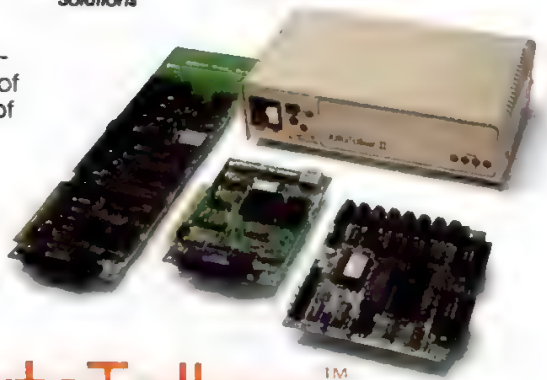

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Fujitsu Microelectronics, Inc., also recently pegged its Micro 16s Personal Computer to MS-DOS: It announced a $200 MS-DOS add-on for its 8-month-old CP/M-86-based computer. "We are not positioning the machine as an IBM lookalike or workalike," insists Arthur Willcox, central regional sales manager for the company, the North American wing of the $4 billion (sales) computer manufacturer. "We consider it an alternative to the top of the PC line."

The MS-DOS version of the 16s offers a full implementation of DOS 2.1, including hierarchical file structure, linkable device drivers, and hard disk support. The Micro 16s uses the new 256K RAM chips, which are incorporated in a 1-megabyte plug-in board. The machine has both a 16-bit 8086 and 8-bit Z80 microprocessor; it supports built-in 5¼-inch floppy disks with 320K of formatted storage and parallel and serial ports. The Fujitsu 16s retails for under $4,000 and includes a monitor, CP/M operating system, and word processing and electronic spreadsheet software.

Of particular interest to individuals looking for computers for home or office is the Panasonic Company's aforementioned Senior Partner, billed as a "personal portable." According to computer division marketing manager E. J. Gelb, who is based in Secaucus, New Jersey, "This is an American product and will not be sold in Japan. We decided on a portable because we believed it offered a better window for our company since it is the highest growing market in the personal computer business."

Even more than 28 pounds of portability, what's expected to turn heads is the price: the Senior Partner lists at $2,495 (single disk drive, and the above six software packages). Add $450 for the optional second drive and $320 for the expansion RAM board that includes an additional 128K of memory. The price also includes a built-in thermal printer, which forms lines either 80 or 132 characters long.

In other respects, says venture capitalist Ben Rosen, the Panasonic "doesn't appear to bring anything to the party that hasn't been there." Sonenclar of the Gartner Group, however, says that he "particularly liked the Panasonic—if just for the price."

The Senior Partner is scheduled to roll into dealer showrooms in March. Like other portables, it has a 9-inch CRT, a 16-bit 8088 microprocessor plus an 8087 coprocessor socket, and 128K RAM—expandable to 512K. Several ports are built-in: a Centronics parallel interface I/O port, an RS-232 interface, and an RGB monitor output jack. According to Panasonic, the Senior Partner was rated "highly compatible" by Future Computing, the Richardson, Texas, consulting firm which specializes in microcomputers.

Sanyo Business Systems Corporation of Moonachie, New Jersey, introduced two versions of a new computer it says have been received enthusiastically. The company, projecting 1984 sales of 10,000 units per month, is already back-ordered with its dealers.

The Sanyo MBC 500, MC-DOS compatible, costs slightly less than the $1,269 retail price announced for IBM's PCjr. The one disk drive version (160K) retails for just under $1,000. Sanyo's upscale version, the two-disk drive MCB 555, can take on the PC as well—but should sell for under $1,400. The basic package for both models includes an 8088 CPU, 128K RAM, parallel printer port and a 1-year warranty. BASICA, MS-DOS 1.25, IUS *EasyWriter I*, *WordStar*, *CalcStar* from Micropro are all bundled with the single-drive unit, and *SpellStar*, *InfoStar*, and *MailMerge* are included with the double-drive.

Sumicom, the Tustin, California, subsidiary of Sumitomo Trading Company, is also moving into the PC-compatible market. In additon to a CP/M-based machine produced by the Japanese Okidata, the company markets a line of System 330 business computers compatible with MS-DOS. In addition to the operating system, all System 330 models are equipped with 128K RAM, one diskette drive, and an assortment of software: the basic configuration costs $2,495. A company source says software run on System 330 machines is 65 to 70 percent compatible with the PC.

Canon USA, in Lake Success, New York, has adopted a U.S.-style assemble-it-yourself approach with its new AS-100 model. For a $2,325 sticker price, you get a monochrome monitor, 128K RAM, and a Centronics parallel interface. For options like a keyboard, a 5¼-inch floppy drive, and MS-DOS, you pay an extra $1,720. ■

It's Delovely, Delightful, Delectable

"Chocolate Diskettes" sounds like the name of a psychedelic rock group, but its no hallucination. Boxes of diskettes made from milk chocolate are available from Sweetware Inc. The diskettes are in 5¼-inch format, so they're compatible with the IBM PC.

Several PC editors tested the two 4-ounce diskettes in a sample box. They were judged to be delicious, unlike many chocolate novelties, though there was some question whether the diskettes were fully Godiva compatible. Our only complaint was that there wasn't enough candy in the box to satisfy our entire staff's cravings.

We predict that technology will progress, and there'll be a new generation of double-sided, double-density diskettes that weigh in at a pound each. Or, even, a bittersweet hard disk.

Hungry? An 8-ounce box of these digital delicacies can be ordered for $12.95 postpaid from Sweetware Inc., 516 Shelburne Rd., So. Burlington, VT 05401, (802) 658-7800. ■

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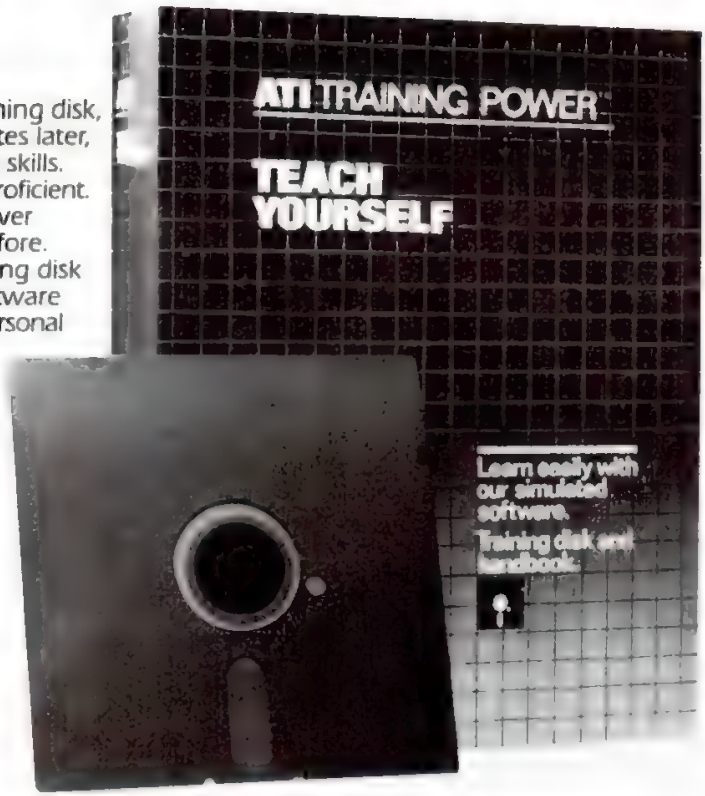

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TI Beefs Line with MS-DOS, Portable

Carry-on's options include speech command, networking, and 3270 emulation

NEW YORK—There's at least one new PC-software compatible portable that won't be marketed as an IBM clone: the Texas Instruments (TI) Portable Professional Computer.

TI's newest model, on sale since December, is hardware and software compatible with all of the other models in the TI family of Professional computers. Since a DOS 2.1 enhancement will be available for the TI Professional models, the TI is largely compatible with IBM PC software as well.

The stripped-down 32-pound TI portable retails for $2,395. It has one diskette drive, 64K RAM, and a 9-inch monochrome monitor with high resolution graphics capability. Alternatively, for $300 more, TI will equip the portable with a color monitor. An operating system is also optional, but customers can choose among MS-DOS 2.1, CP/M-86, concurrent CP/M-86, and the UCSD-p system.

The TI portable's built-in slots allow users to expand memory to 256K and add an 8087 coprocessor chip. Memory can be expanded even further with TI peripheral offerings: an additional floppy drive ($475), a 10 megabyte Winchester disk ($2295), and extra boards that increase RAM up to 768K (about $1500).

The TI Portable Professional will support TI's Speech Command, a combined hardware and software package for voice recognition and synthesis. Two other products recently announced for the TI professional line will be available in February. They are:

—EtherSeries software, which can link TI computers (along with IBM PCs) into a 3Com Ethernet local area network. TI representatives have been trained to install and service the network. The basic hardware and the EtherSeries software costs $2745.

—IBM 3270 "dumb" terminal emulation software, $675. ■

TI Professional family gets portable

ITT Courier Joins Microcomputer Race

It's an ITT XTRA: big corporate challenger to IBM offers PC, XT compatibility

What has three letters, starts with I, and is a company that sells personal computers?

Wrong. It's ITT, which recently announced the XTRA, a machine the company says is hardware and software-compatible with IBM's PC and XT.

Scheduled for sale in late spring, the XTRA will cost $3,000 for a model with one disk drive, 128K, RS-232C interface, parallel printer port, ITT DOS 2.0, and GW BASIC. For a second disk drive, it's $500 extra. With 256K RAM, one floppy drive, and a 10mb hard disk, the system goes for $5,800.

ITT says the XTRA is "the first real alternative to the IBM personal computer." As advantages, the company cited "an optional user-friendly mouse" and commands "from window menus written in English."

ITT has 80 representatives who make direct sales to corporations—as compared with 1,300 at Sperry Corporation, which recently introduced the Sperry PC. ITT will sell through dealers as well, and plans "a multi-million dollar advertising campaign" to promote the XTRA.

According to John Di Matteo, director of public relations, the XTRA is the result of a combined effort by several ITT divisions. A technology center in Connecticut programmed the computer, and ITT's Qume Corporation, which sells printers and disk drives, did "the initial design, a lot of the prefab work, proto-units, and testing," Di Matteo says. ITT Courier Terminal Systems, Inc., of Tempe, Arizona, will manufacture and market the XTRA.

The XTRA will be part of a family of products that reflect "an expanded focus on the office communications market," ITT says. Di Matteo indicates that ITT will release some communications products for the XTRA—there are no networking or 3270 terminal emulation capabilities yet ■

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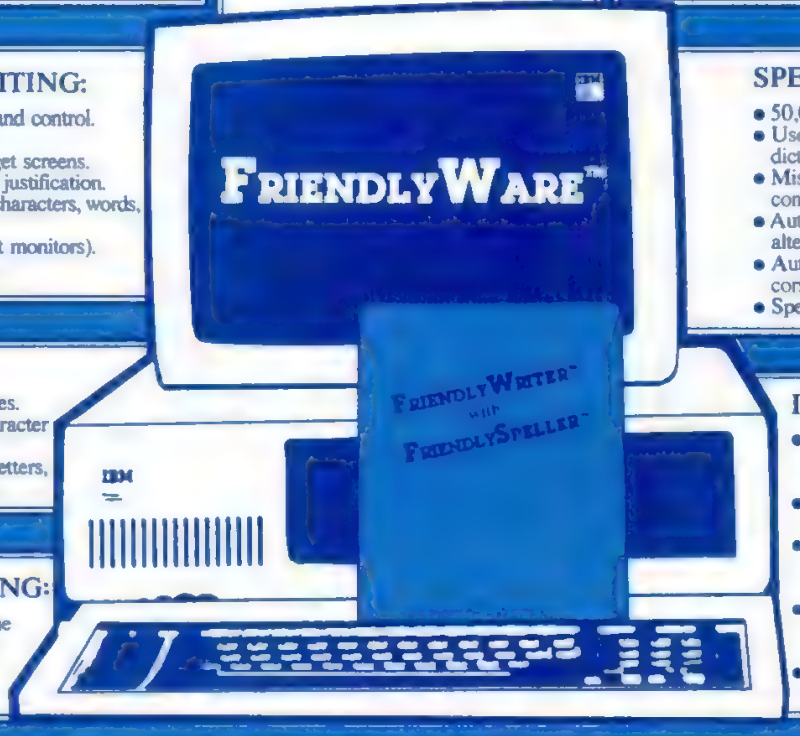

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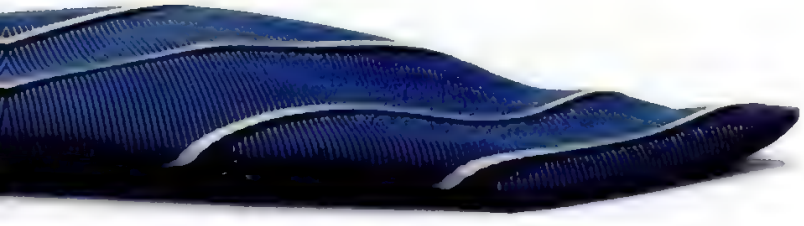

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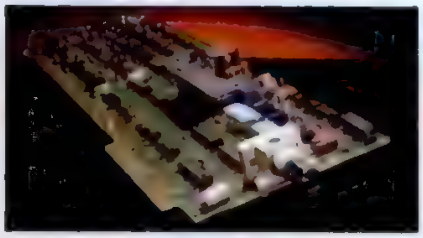

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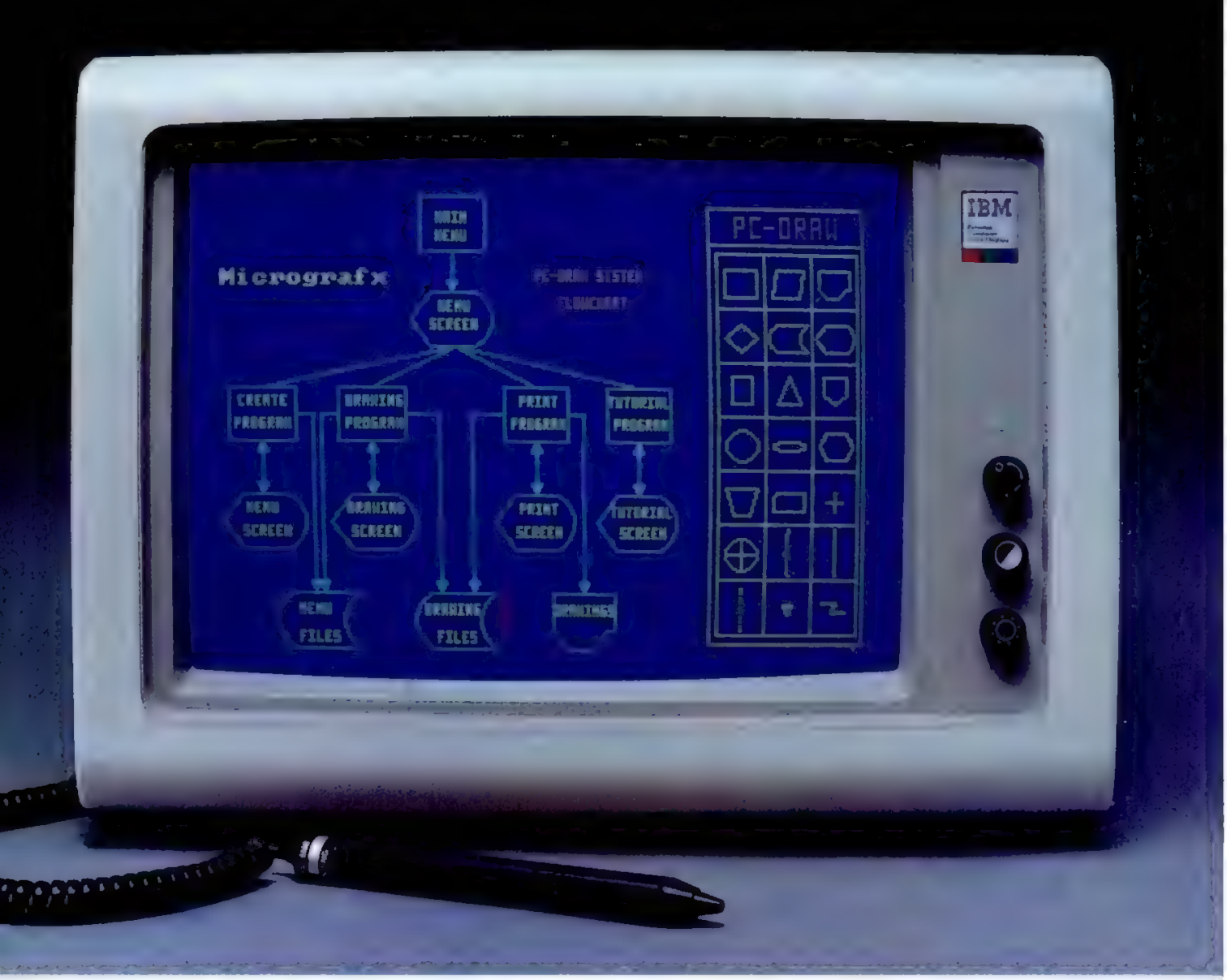

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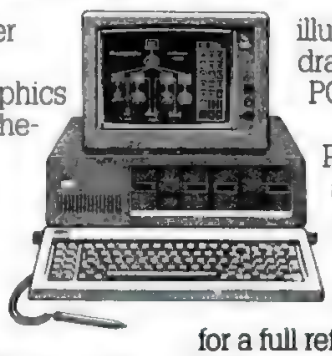

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Who'll Clean Up with PC Window Software?

Many software developers put windows on display, but how many are nothing but wind?

BY JAMES LANGDELL

'Tis the season for windows. In recent weeks, more than a half dozen companies have announced products that provide the IBM PC with "software environments" with windows. To date, however, few of these window products have been actually delivered to users. Esther Dyson, president of Rosen Research, Inc., has appropriately coined the term "vapor ware" to refer to all the integrated windowing software that doesn't exist—apparently.

In fact, *PC Magazine* has only seen one windowing program—Trillian's Visu-ALL—in its commercially available form. Even Visi On, which was announced a year ago and was supposed to be available at the end of November (see PC News, *PC*, Volume 3 Number 1), has not been forthcoming to our office. Even though demonstration versions of Visi On are already available, more time is required for "enhancing print and save functions," according to spokesman Chuck Meyer of VisiCorp.

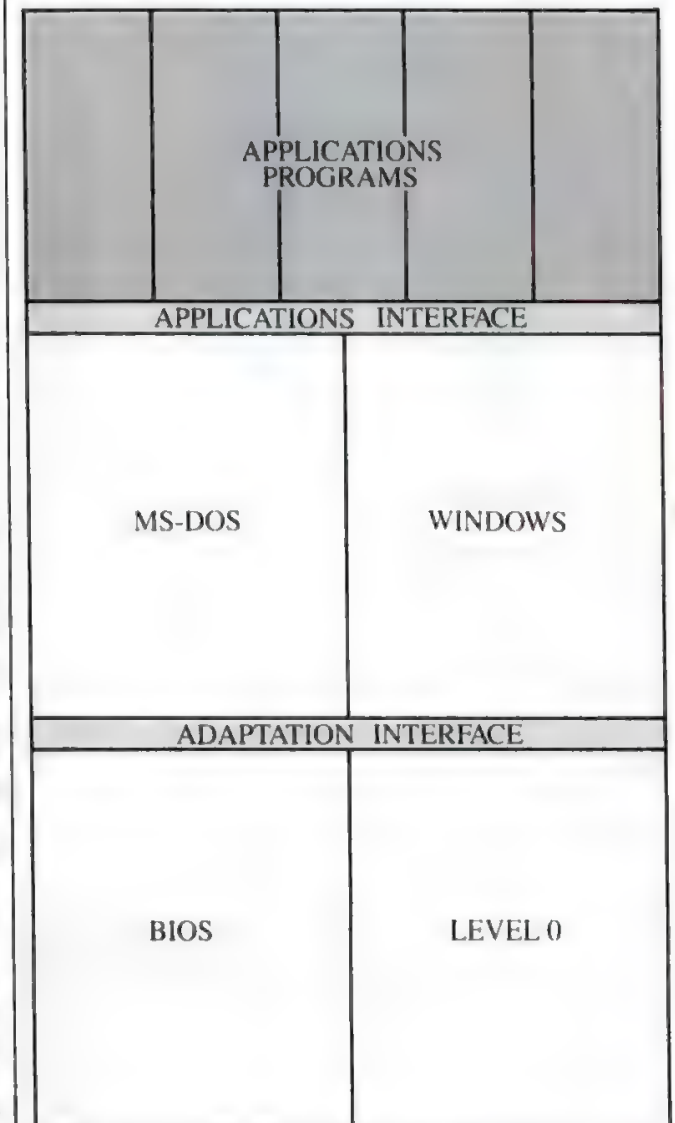
Quarterdeck Software's DesQ (announced early in 1983) and Structured Systems Group's WindowMaster won't be available until the beginning of 1984, nor will Digital Research's new version of Concurrent CP/M-86, which it announced would include windowing. And Microsoft's Windows, although announced with much hoopla in late 1983 won't be available until April 1984 at best. It seems, suggests Dyson, that software "has to be 125 percent ready before it is really ready."

While the window business is still opening up—and waiting for claims to be backed up by actual products—there's a chance to pause long enough to clear up several points of confusion before reviewing individual programs in subsequent issues.

It's important to remember that not all windows are alike. Windows are a just a graphic means for presenting capabilities of various kinds—not all of these functions are provided by a program just because it uses windows. These are some of the functions a system might offer through its windows.

- HELP. Windows can provide a help function. When a user requests help while using a program, a window can appear, superimposed on the program screen. This window might contain an explanation, definition, or a list of options and commands. These windows would be for reference only—the user would have to return to the program to enter any commands through the program's normal method.
- COMMAND MENUS. Windows can provide a menu that lists commands or options. The user can point to an item in such a window, and thus select it to be executed automatically.
- SIMULTANEOUS DISPLAY. Different programs or files can be displayed simultaneously in separate windows on a screen. Only one of the windows, however, contains a program that is now functioning—the material in the other windows is for reference only.
- INTERFACED CONTROL. Different programs or files are displayed simultaneously in separate windows—and any one of these programs can be activated by pointing to its windows. Transfer of control from one program to another and the opening and closing of files is handled automatically.

(continued)



Microsoft's description of its Windows product. It supplements MS-DOS at a level of software that interfaces with specific hardware below and generic applications programs above.

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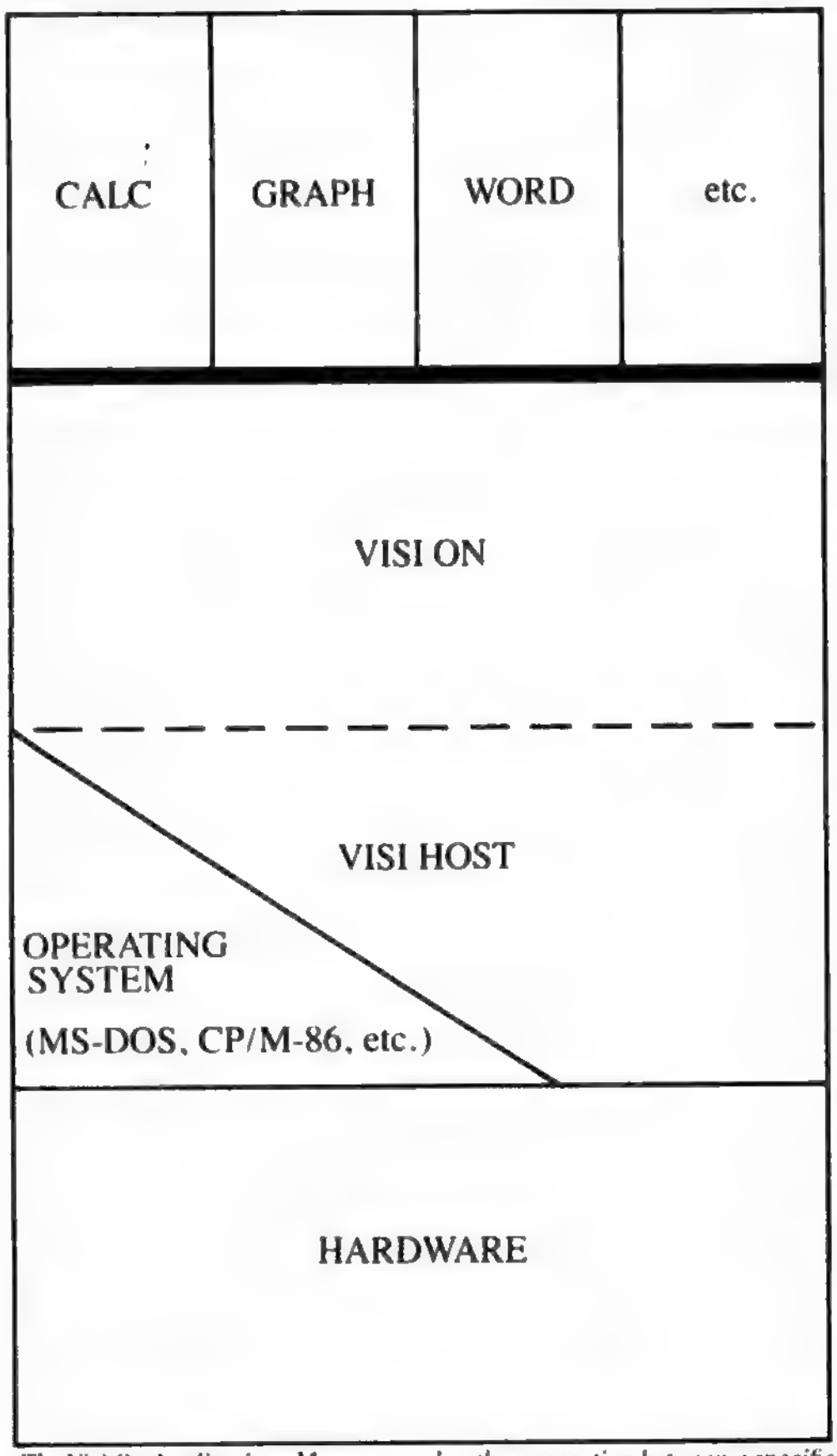
• DATA INTEGRATION. Different programs in separate windows are integrated so that data can be transferred from one program into another through window operations. Only these data transfer operations, however, involve more than one program at a time.

• SIMULTANEOUS PROCESSING. Different programs are able to process simultaneously, and the ongoing state of each is displayed in separate windows.

The various window environments offer different combinations of these features. VisuALL, the most modest in price and hardware demands, offers only help and menu selection capabilities. The Microsoft Windows and Visi On environments offer the potential for most of these features, although simultaneous processing is dependent on whether the environment's underlying operating system provides this capability.



The Visi On Applications Manager makes the connection between a specific configuration of operating system and hardware, and any Visi On-compatible applications programs. The Visi Host is the portion of Visi On's code that must be tailored for a particular configuration.

Digital Research (DRI), with its Concurrent CP/M-86 (CCP/M-86), is perhaps the only company to already offer an operating system for the PC that has simultaneous processing. DRI, however, has yet to provide a windowing enhancement that would make it easier for users to tap this power. Windows are promised as part of the upcoming version of CCP/M-86, which will be launched with the more aggressive price of $150, down from $350.

Window products also differ in the amount of hardware a user must invest in before he can make effective use of the software environment. At the low end, VisuALL can be used on a PC with as little as 64K and a single disk drive. All VisuALL does, however, is provide "shells" that display a program or operating system's commands in an easier to understand form.

Most window systems, however, are intended to exploit the resources of a rather rich hardware environment—say, a computer with at least 256K, a hard disk, and bit-mapped graphics. Owners of smaller systems may feel disenfranchised in the near future, if software developers design most of their new applications programs to run only on the well-endowed machines targeted by the window makers.

Another difference between window systems is how each manufacturer is assuring that applications programs that can be integrated into its environment will be available. Here are some of the strategies window builders have used in the marketplace to date.

• Tailoring the window environment so that users can run many PC-compatible programs in it without modification. These window makers should avoid offering features that would undermine this compatibility.

• Providing users with shells that are tailored for specific programs that enable those programs to run in that window environment. (These window makers depend on third parties to provide the applications programs, but don't have to rely on their cooperation to provide compatibility.)

• Offering a line of applications programs that are specifically intended for its environment. These could be programs developed by the window maker or versions of third-party programs that were licensed to be tailored for a particular window system.

• Making the environment an open system, allowing third parties to produce programs, if they wish, that are compatible with the windowing system.

• Seeking the cooperation of other companies to establish one window environment as a standard for the industry, on the same level as a popular operating system. This would require motivating third parties to make their programs compatible with that environment.

Trillian's plan, for example, is to make its VisuALL system easy enough for users to create "profiles"—shells that make specific programs easier to use. The company also offers profiles for a number of popular programs, which users can purchase if they'd rather

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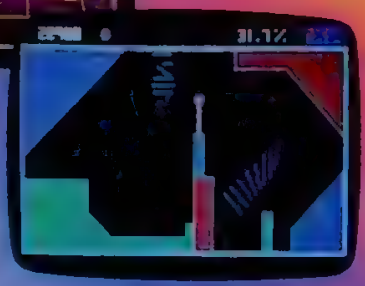

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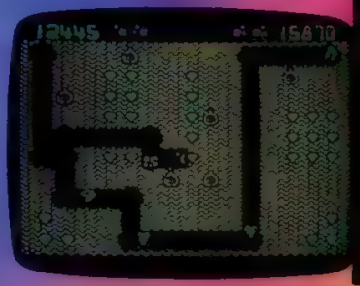

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avoid doing the work themselves. The original manufacturer of an applications program needn't be involved in the process of making its software compatible with VisuALL.

At the top floor of the window market, Microsoft and VisiCorp seem to have reached the point of direct confrontation. The diagrams on these pages, which show how each company explains its product's function, illustrate how similar are Microsoft and VisiCorp's positions.

Microsoft sprung news of its coming Windows product about a week before VisiCorp announced that Visi On was ready. Speaking at VisiCorp's press conference, at Manhattan's Windows On The World restaurant, its chairman, Dan Fylstra, made pointed comparisons between Visi On and Windows. Fylstra titled his presentation "Windows or Mirrors?" and said that, although many software companies have announced products that appear similar to Visi On by making windows, "some will do it with mirrors."

When VisiCorp announced the Visi On product line in 1982, it gave the impression that this window environment was to be used exclusively by VisiCorp's own applications programs, thus, a closed system. However, by the time Visi On had officially debuted, VisiCorp had changed it to an open software environment and was encouraging outside developers to write software that is compatible with Visi On. For this purpose, VisiCorp now offers an extensive set of Visi On software development tools, including a menu compiler. As a result, VisiCorp has become a player in the system software business.

Even though the Visi On Applications Manager must run on an operating system, it makes the applications programs independent of the underlying operating system. If enough users purchase the Visi On Applications Manager in order to run programs such as *Visi On Calc*, software developers may find the Visi On environment to be as effective a target as an operating system for writing software that can be marketed to a wide base of users.

While VisiCorp got into windows by going deeper into the systems software structure from its high-level applications programs, Microsoft reached the same point by coming from the bottom up. Microsoft presents its Windows as an extention to its MS-DOS operating system, and so far has at least 23 computer manufacturers interested in offering Windows along with MS-DOS as a standard part of their systems.

MS-DOS has been embraced by makers of applications software as the key to marketing programs to the largest base of 16-bit computer users, but this operating system hadn't provided standardized ways to access bitmapped graphics and other advanced hardware features. Nor did MS-DOS have the integration and capability to allow more programs to share data and operate together. Microsoft claims that its Windows fills the gap between what today's hardware can deliver and what MS-DOS is able to access.

If Windows works as part of an operating system, it will provide standardized versions of functions that, at present, have to be designed from scratch as part of any set of applications programs. While the prospect of a major, upward-compatible improvement to MS-DOS is good news for software developers who use this operating system, developers might be apprehensive about Microsoft's strong moves this past year into the applications software market.

When Windows is available, Microsoft will also make available new versions of its *Multiplan* and *Word* program that are revised to work within the Windows system. This puts Microsoft in the same league as VisiCorp: Companies that offer window environments as open systems, but who have first crack at producing programs that use the systems.

In the window war, so far VisiCorp has the advantage of delivering its Visi On software several months before Microsoft expects its Windows to be ready for market. VisiCorp also has importantly gotten the nod from IBM, which agreed to offer Visi On through its sales centers.

Microsoft, once its Windows are ready, undoubtedly hopes to get an even stronger boost from IBM. After all, IBM turned to Microsoft for the PC's primary operating system and came back for more when it was time for PC-DOS 2.0 and 2.1. However, IBM has said nothing yet about Windows. In any case, Big Blue is likely to wait until Microsoft has successfully created this software, which they've promised for the end of April.

The message: Keep watching the windows. ■

New Products Using Windows

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A Mighty Pleasure Dome Was Decreed

New construction twist: the user-friendly house

In the 1798 poem "Kubla Khan," Samuel Coleridge used a wealth of luxurious detail to create a sensual, imaginary paradise called Xanadu. In his 21st-century version of "Xanadu: The Computerized House of the Future" near Orlando, Florida, builder Robert Masters uses intricate computer technology and a new architectural discipline called "architronics."

Beyond post-modern: the house that architronics built

Architronics integrates "architectural design with electronic technology to create a built environment that actively responds to human needs," a Xanadu publicity release says.

The central architronic device at Masters' Xanadu is the House Brain, divided into right and left hemispheres with different functions. The House Brain is so responsive, Xanadu publicity says, that it is possible to imagine "a house that is also your *friend*."

The intuitive right brain will do its mechanical best to promote the emotional well-being of the house's inhabitants. For example, one room features a "sensorium," a couch with built-in sensors that record various physiological data, then send that data along to a computer that analyzes the sitter's state of mind. The computer then projects colorful images on the room's walls to encourage or discourage the sitter's mood.

The left brain, colder and more analytical, links computerized appliances to a central house controller. This is an advanced version of the BSR controllers already being marketed for microcomputers like the PC. Even now, microcomputers can help control lights, regulate thermostats, and link alarm systems to the neighborhood police station.

Unlike the BSR controller, however, many of the devices at Xanadu are not really functional. As architect Roy Mason acknowledges, much of the interior of the house is an elaborate mockup, designed mainly to suggest combinations of electronic appliances that seem most likely to appear in houses of the future. Much of the software required to make Xanadu work is too expensive to install.

On the outside, Xanadu is sparkling white and gently rounded. Xanadu's "epidermis" was formed by covering room-sized vinyl balloons with layers of rapidly-hardened polyurethane plastic foam. If the Xanadu look caught on, it would mean a radically different look for America's landscape: millions of these user-friendly, marshmallow-like complexes drifting along the nation's byways, their electronic brains beeping out the music for the *Wizard of Oz* movie's famous song: "If I Only Had a Heart." Xanadu is open daily. ■

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The KB5151 has separate cursor command keys, a separate numeric pad, top row function keys with a removable template and a pencil and book holder ridge.

The top row function keys are simply a matter of convenience, says Mark Tiddens, corporate marketing manager with the Washington state firm. More critical, he says, is the location of the cursor keys.

"When you're using a spreadsheet program, especially, it's cumbersome to have the cursor on top of the numbers. Now they're separate, eliminating that problem," he explains.

The KB5151 also features shift and return keys that are located precisely as they are on a standard typewriter.

The full-travel keyboard for the PC Junior is identical to the KB5151 and is expected in April. The PC version will be out in March at a suggested list price of $255 and is available through authorized distributors and dealers. The PC Junior keyboard, the KB5151J, has the same price and availability, the company said. ■

Product Review

The Dvorak Keyboard's Different Strokes

IBM PC Plug—Compatible Keyboard, Dvorak Layout
Model KB5150D
Key Tronic Corporation
P.O. Box 14687
Spokane, WA 99214
(800) 262-6006
List Price: $209

Have you ever stared at your typewriter's keyboard and seen no more order to its letters that those found in a bowl of alphabet soup? Have you ever suspected that there was some conspiracy to make typing as difficult as possible? Well, you were right. The usual keyboard, with Q-W-E-R-T-Y in the top row of letters, was designed over a century ago to slow down typists who could otherwise press keys faster than the early mechanisms could handle. Even though typewriter technology improved greatly well before the electronic age arrived, the old spoiler key arrangement stuck.

One person who was appalled by the Qwerty keyboard was August Dvorak, who in 1932 designed an alternative keyboard. He placed the most frequently used letters in the most easy-to-reach spots. (The Dvorak keyboard was discussed by Gary M. Kaplan in his article "Bye-Bye Qwerty," which appeared in *PC*, Volume 3 Number 1.) If you've wanted to equip your PC with a Dvorak keyboard, it is now available from Key Tronic.

Key Tronic already offers standard keyboards for the PC (see "Key Tronic's Soft Touch," *PC*, Volume 1 Number 9) and supplies the keyboards used by several makers of IBM-compatible personal computers. On this Dvorak keyboard, as with other Key Tronic products, the key action is softer and quieter than IBM's. There are LEDs (light emitting diodes to indicate on/off) built into the Caps Lock and Num Lock keys that turn on when these modes are switched on.

Aside from the keys that were relocated for the Dvorak arrangement, Key Tronic made a few other changes: the left shift key and the backslash key have switched places, and a new Enter key, which supplements the Return key, is located in the lower right corner.

The placement of most letter, number, and punctuation keys follows the ANSC's 1979 standard for Dvorak keyboards. There's one confusing change in the layout, however. The key with the cedilla (¸) and single open quote (') symbols was moved up to the top row, between the Esc key and the numeral 1. This causes all the number keys on the top row to be jogged one position away from where any typist—whether accustomed to Dvorak or Qwerty—would expect them to be.

Another way of changing your PC over to the Dvorak system would be to run software that reassigns characters to the keys differently. But if you're ready to make the commitment to learning how to type Dvorak-style, you'll find enough ease from using a dedicated keyboard to justify the greater expense. After all, if typing speed matters that much to you, you probably want to get the best tools for the job.

On the other hand, if you don't want to learn the Dvorak system, you can use Key Tronic's Dvorak keyboard to encrypt your texts. Just type on it as if it was a standard Qwerty keyboard. You'll see "the quick brown fox" come out as "yd. 'gcjt xpr,b urq". That should be enough to confuse any lazy dogs. ***—James Langdell***

Product Review

LSF—The Least Squares Curve Fitter

LSF—The Least Squares Curve Fitter
Prentice-Hall, Inc.
Englewood Cliffs, NJ 07632
List Price: $39.95
Requires: 64 K, PC-DOS 1.1, printer.

If you must work with statistics, software that makes the PC take care of number crunching can be a real boon. However, this *LSF* package is an extremely limited statistical software package. All it contains is a routine that does curve fitting for a pair of variables by deriving first, second, and third degree equations using the least squares method. Apart from listing the results of these calculations for up to 300 data points, this program does nothing but print out (not display) a plot of the actual data points and the analogous points on the smoothed-out curve.

The amount of variance accounted for in the curve-fitting equation is not reported in any expected form. The only account of error is given by a list of the differences between the observed and calculated values for each data point, which is summarized in a single value—R, the sum of the squares of the differences. The program doesn't perform more significant tests, however, which might have provided a better report of the average and maximum variances between actual and smoothed values.

LSF streamlines the process of setting up data files to store the values for a set of data points. Within the program, you can call up these files edit them to correct numbers, and delete any data points that had been entered previously. Once a file is created, however, you cannot use the program to append additional data points. You must either create a new file and key in the original set of data again before adding new items or else work through a

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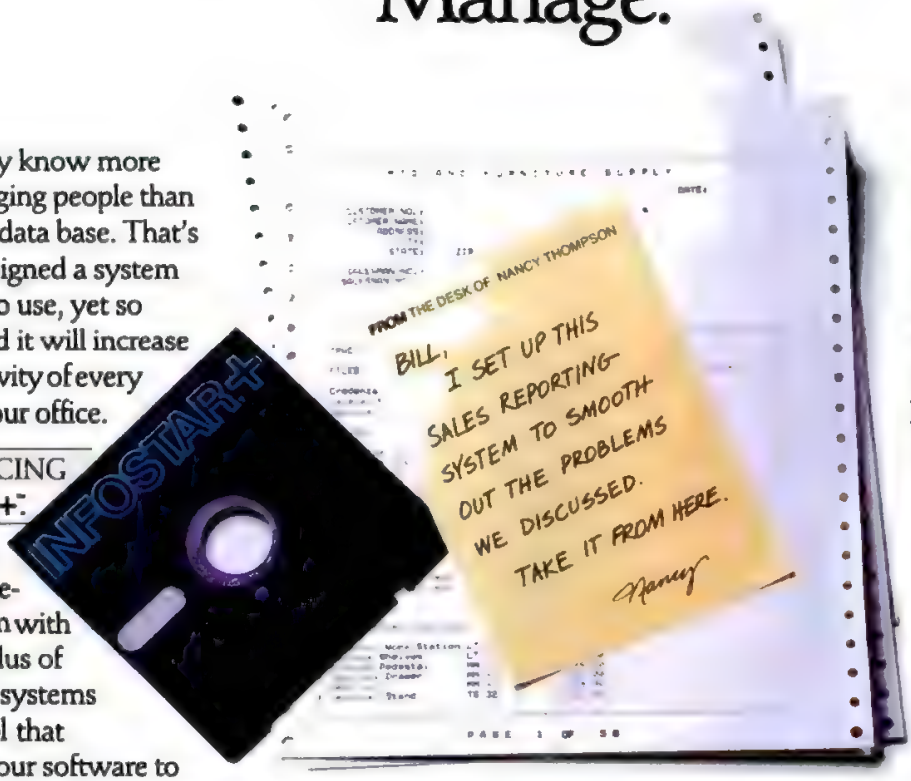

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text editing program, such as EDLIN, to make additions to the file.

It's odd to see a commercial software package offering such a limited function at this price. Prentice-Hall's *LSF* isn't even a module in a series of statistical programs—least squares curve fitting is all you're going to get from this software investment. The equations produced by this program can be produced by similar multiple-regression programs that are offered in many books of BASIC program listings and on public-domain software disks distributed through PC user groups and on-line bulletin boards. For example, you can key in a few pages from *BASIC Programs For Scientists And Engineers* by Alan R. Miller (Sybex Books) or use the public domain program called SCI2-1.BAS, which is one of a series of scientific routines.

Any general-purpose multiple-regression routine can be used to derive curve-fitting equations. To get the first degree linear equation ($y = A + Bx$) with the best fit, simply plug in variable x to predict variable y. To find the best quadratic, second-degree equation ($y = A + Bx + Cx^2$), use two predictor variables: x and x^2. For the best-fitting cubic equation, use x, x^2, and x^3 as the predictors.

What Prentice-Hall's program offers is a straightforward data entry routine, tidy printouts of its graphs and data tables, and a 50-page manual that also explains the mathematics behind the least squares technique. *LSF* is not copy-protected; it can be copied onto 44,160 bytes of a diskette or hard disk. But if you feel you need a curve-fitting program, check to see if you already have a better—and cheaper—software tool close at hand. The 40 bucks you save by not purchasing *LSF* could buy a fine dinner for two next Saturday night.

—Bob Lee,
James Langdell

Calendar of Events

DATE	EVENT	COMMENT	LOCATION	CONTACT
February 15-17	Data Communications In-Depth Workshop	Presentations on the managerial, technical, and operational aspects of data communications.	Marriot Hotel City Ave. & Monument Rd. Philadelphia, PA 19131	Data-Tech Institute 386 Franklin Ave. P.O. Box 569 (201) 661-2300
February 22-24	See above	See above	Marriot Hotel 2 Stamford Forum Stamford, CT 06901	See above
February 29-March 2	See above	See above	Hyatt Regency at Crown Center 2345 McGee St. Kansas City, MO 64108	See above
February 20-22	1984 Office Automation Conference	Emphasis on office automation.	Los Angeles Convention Center Los Angeles, CA	American Federation of Information Processing Societies, Inc. 1988 Preston White Dr. Reston, VA 22091
February 21-23	Softcon	Software industry trade fair.	Louisiana Superdome New Orleans, LA	Northeast Expositions 822 Boylston St. Chestnut Hill, MA 02167
February 27	Micro-Focus '84	Hardware and software. 70 exhibitors.	World Trade Center New York, NY	Micro-Focus '84 James J. McLaughlin 2517 Highway 35 Building D Suite 202 Manasquan, NJ 08736 (201) 528-6929
March 23-25	West Coast Computer Faire	Hardware, software, and speeches by prominent industry executives.	San Francisco, CA	Computer Faire, Inc. 570 Price Ave. Redwood City, CA 94063 (415) 364-4294

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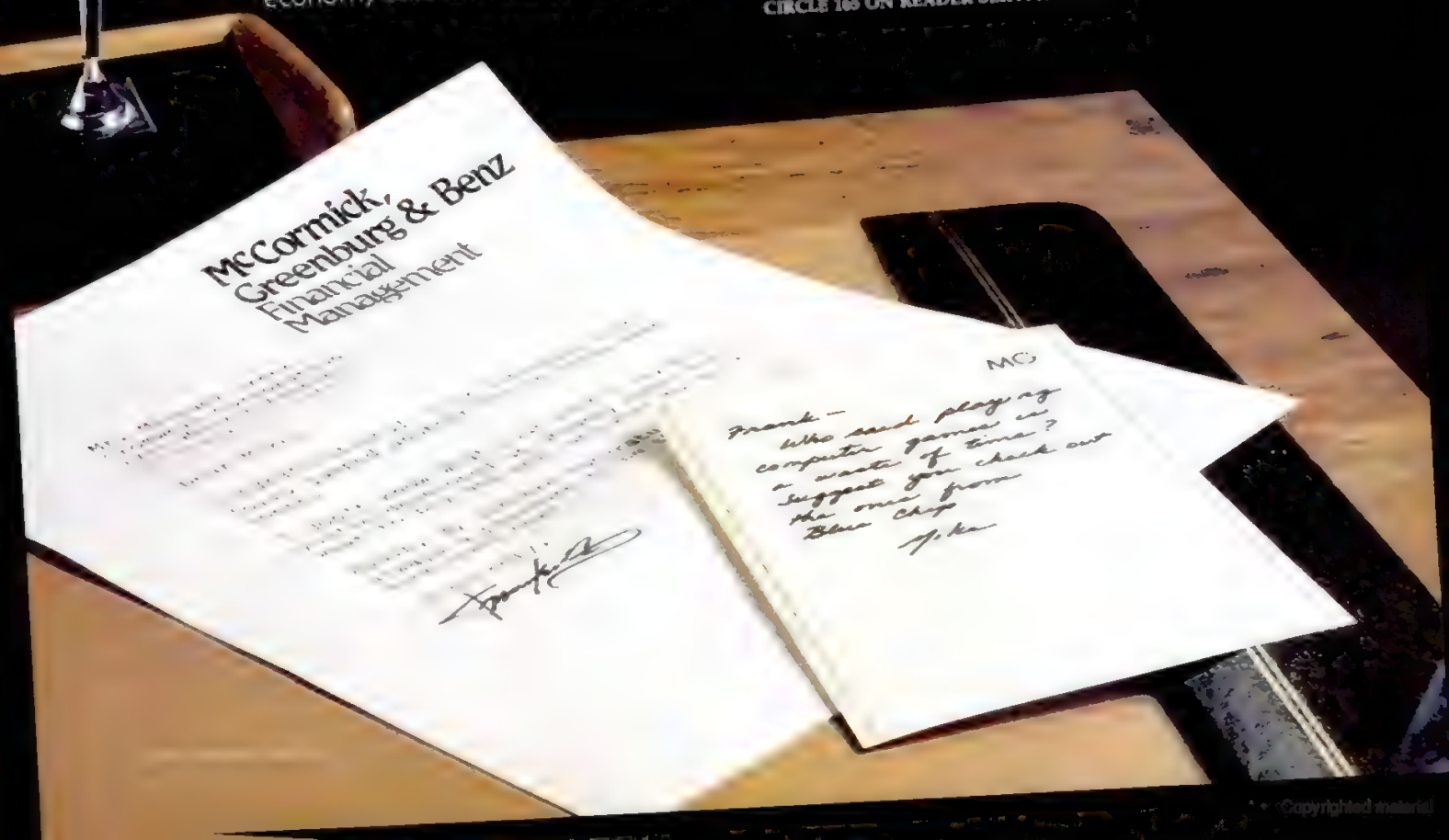

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People in the News: Timothy Leary

Quick: What does LSD stand for? Wrong! Answer: "Leary's Software Development."

BY ELIZABETH MEHRIN

Now everyone knows that in Los Angeles, the rules of social etiquette are a bit...well, different. But really, a coming-out party for a personal computer?

Yet there it was, in all its near-soundless electronic glory: Timothy Leary's new IBM PC. Hovering admiringly around it, a flurry of guests in standard Palm Paradise party attire—leather, silk, neon hair, and the odd (very odd) three-piece suit—sipped white wine, played with Leary's airedale Stretch Limousine, and offered all the appropriate remarks one would expect to hear at a debut.

"Tim, it's *beautiful*."

"The max, Tim, the max."

"Tim, make it talk."

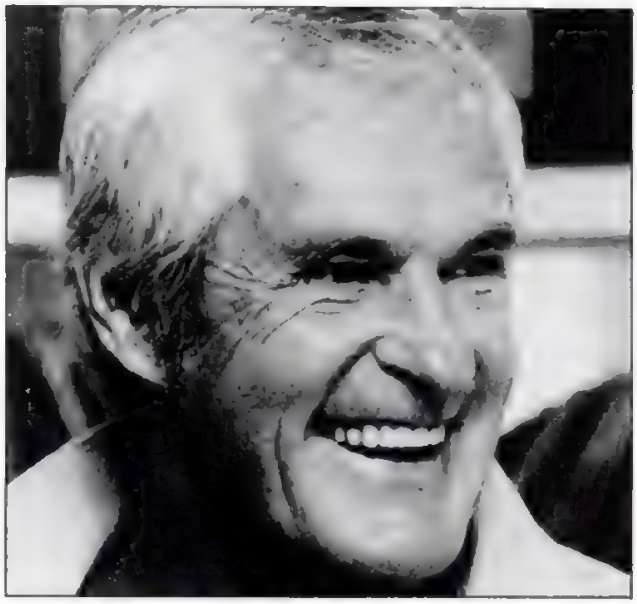
In fact it was not the onetime patron saint of psychedelica who communicated via the benign-looking terminal sitting on Leary's red lacquer picnic-table-turned-work-station. Instead, Dale Hillman, vice president for the Minnetonka, Minnesota-based XOR software corporation signed on and started up a friendly little computer chat; at Leary's home on Wonderland Park Avenue in Los Angeles.

"Hi," the obviously uninspired Hillman began.

Summarily, from faraway fellow XOR vice president Michael de St. Hippolyte, a more inventive response appeared:

"Hello, Hollywood, hello!"

XOR is a software corporation best known for its games EDO and St. Hippolyte's Wall, along with its Blu(cq) Chip "broker on a disc" portfolio manager. Their newest product, in a manner of speaking, is Dr. Timothy Leary.



For as Leary explained it, the new team of Leary and XOR is intent upon exploring what is "simply the most exciting turf in the world": artificial intelligence. Famous—and in some circles, infamous—for his work with drugs that, as he put it, "access the brain," Leary has also spent the last quarter of a century developing a variety of complex models of the human brain. Enter XOR, a family-sized corporation composed largely of what Leary calls "graduates of the famous Harvard class of '78." Said Leary: "So, using my brain models, they are going to program the software" to simulate a brain.

The result, according to Leary, will be "an adjunct of your brain"—a personal computer "that's going to be programmed to learn what you tell it to learn, and to stimulate you to learn." The new software will not do floors or windows, Leary conceded, but beyond that, he said, the possibilities are limitless. Rather than a mere machine, this PC will become a "partner." Individuals will have individual programs, Leary went on, "so they can program their own personal partners, and then, so they can link up." He smiled. "So your partner can link up with my partner." Another smile, and a wolfish twinkle of the eye: "And if they like each other..."

More seriously, Leary hails this juncture of "philosophy, psychology and computer technology" as "the inevitable future of home computing." Turning political, he notes that "as you know, Japan and America are developing artificial intelligence programs that involve $1 billion budgets." Computerized intelligence is on such a threshold, Leary believes, that "the situation is very much the way (psychedelic) drugs were in the early 1960s."

On the one hand, he said, there are the struthious souls who argue that "you shouldn't train machines to be smarter than human beings." Others, veterans mostly of the try-anything '60s, want to create what Leary dubs "superior machines." Still others apparently want to apply those superior machines to nefarious purposes.

So hot is the issue that in Leary's view, "computers are the psychedelic drugs of the '80s—oh, absolutely," because, "like psychedelic drugs, they are mind-expanding."

Hard at work on a novel about a man, a woman, and their computerized child SKIPI (for Super Knowledge Information Processed Individual), the 63-year-old Leary, meanwhile has updated his psychedelic-age mantra to fit this new era of computers. Rather than the "Tune In, Turn On, Drop Out" that made him famous, these days Leary is humming something more along the lines of "Tune In, Sign On, Boot UP."

And when things get electronically crazy, he said, "instead of flipping out, you say you crash." ■

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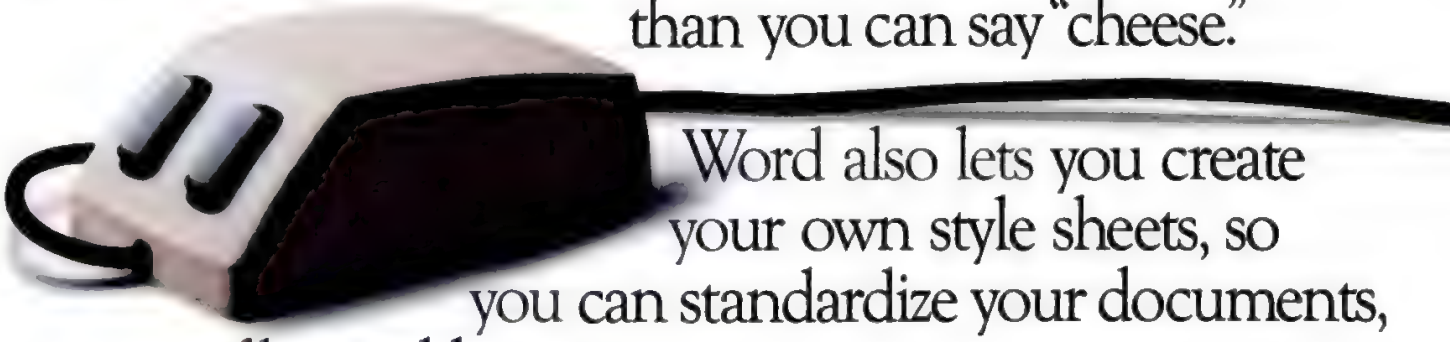

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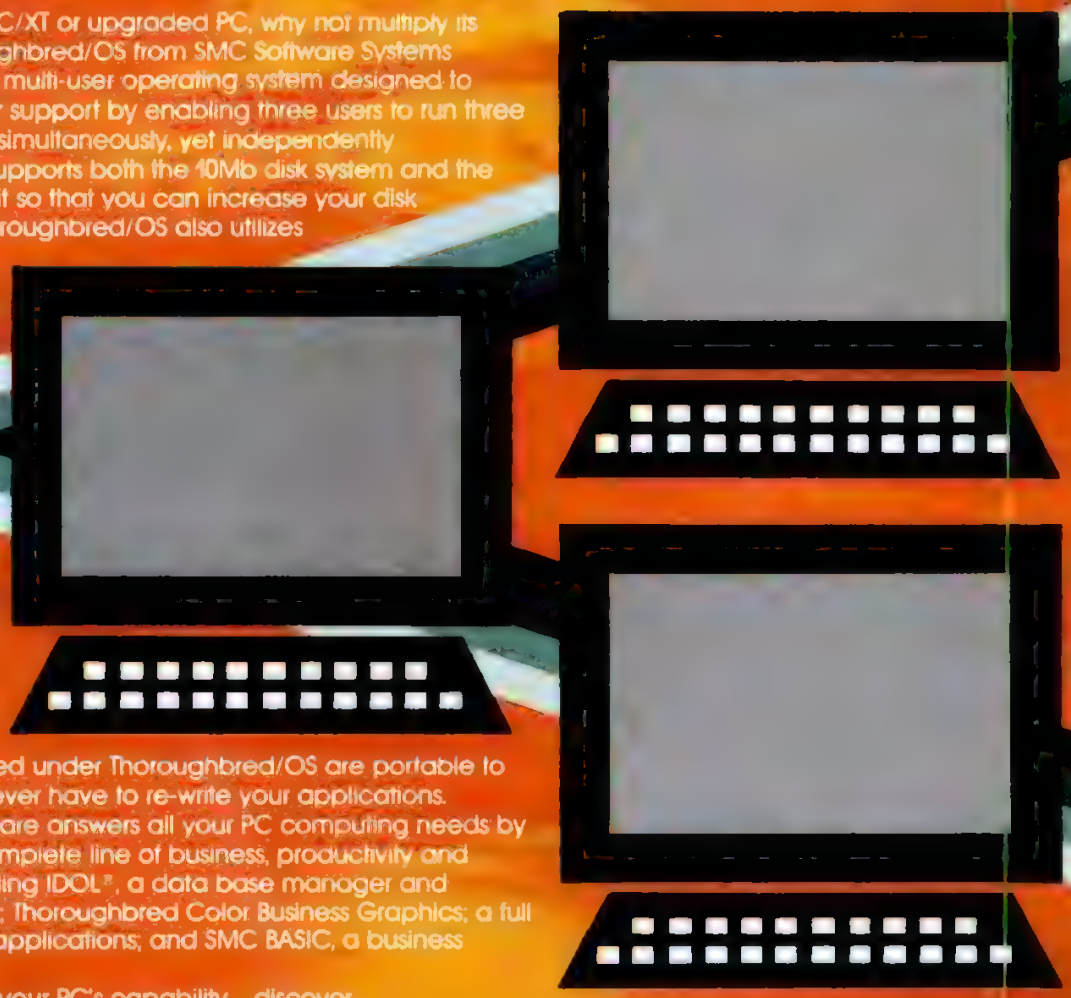

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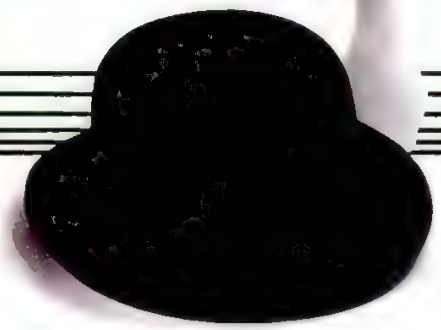

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CIRCLE 149 ON READER SERVICE CARD

An Identity Crisis In Every PC

We can ask the question: "Who's in charge here?" and attempt to define and redefine the term *hacker,* but the future will have a way of defining itself, despite our best efforts.

I was riding to work on the train the other day. As usual, my Radio Shack Model 100 was perched on my lap. As I was putting the finishing touches on an article, a fellow passenger did the customary double take (I call the Model 100 the "$799 Cure for Loneliness"). With eyes as large as saucers, awe in his voice, he asked, "Is that a computer?" When I answered in the affirmative, he paused and asked in hushed tones, "What's it telling you?"

Which brought to mind a point. The mere fact that you're reading this magazine sets you apart from millions of other people who have no contact with computers—other than the involuntary, unpleasant kind—in their daily lives. To wit: credit card statements in which the finance charges are uncompromisingly calculated to two decimal places; on-line cash registers that refuse all forms of monetary compensation for desired purchases; smart-aleck kids who were seemingly born understanding the mumbo-jumbo of computerese. We can't overlook the incredible smear job that the movies and TV have done on computers. They have become benevolent dictators, killed in the search for autonomy, impregnated Julie Christie, and blown the world to smithereens. It's no wonder that they perceive computers to be instruments of intimidation.

Given this dismal frame of reference, it's no wonder that my fellow commuter

Bill Machrone

assumed that the machine was giving me my daily instructions or reminding me to sit up straight. His question, though, has some interesting implications. Everyone who uses a computer derives the same basic benefits. The task at hand can be completed faster and is generally more thorough and error-free than that done by a person. Assuming, that is, that the task was suitable for computerization in the first place.

The accountants of the world were quick to realize that the machine could remove a good deal of the drudgery from their jobs and promote them to oracular status in the corporate structure. The common man has been led, even encouraged, to feel stupid and futile in the face of the unerring might of the computer.

How many PCs would IBM have sold if the actual subliminal message were: "There's a little identity crisis inside every PC." Being the smart marketeer that it is, it instead chose an everyman in the form of the Little Tramp to represent the company. But you don't turn around a generation's conditioning in a year or two, even with Super Bowl ad spots.

Since reality is subjective, we must remember that our ownership and use of microcomputers will be looked upon as progressive by some and seditious by others. Letting users "own a piece of the rock" is the last thing that many corporate MIS managers had in mind as they saw the vast, uncontrollable sea of PCs rolling in on them. Some companies have come up with workable microcomputer implementation plans, while others are hopelessly mired in protectivist feifdoms.

Who's in charge? The users? The DP managers? Who can tell? Certainly not top management, and certainly not the guy on the train. The future has a way of defining itself, despite our best efforts. Visionaries are those who recognize changes early and adapt and use them.

Visionaries such as George Tate, the man who got dBASE II off to an early lead in the CP/M marketplace. Now, dBASE II is the dominant database product, not because it is the best, but because it is the

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Choose 2 or 4 320K byte half heights or 2 half-heights plus a hard disk.

- Powered by energy efficient direct drive DC motor
- Mounting kits available for most popular systems
- Clear and simple instructions
- Full one year warranty

IBM-PC 10 Megabyte Half-Height Hard Disk
Up grade your PC to an XT! Call 609-799-4440 10 Megabyte Half-Height Hard Disk also available for your COMPAQ
SA 712 Half-Hgt 10 Meg Hard Disk Call!

SHUGART HALF-HEIGHT DRIVES

Shugart SA465 DS/DD Half Height 96TPI
New! Allows reading and writing in single or double density 5.25 diskettes. Plug compatible with TANDON TM 100-4, SIEMENS FDD-221-5 and similar drives
1 YEAR WARRANTY $350 each 2 @ $295 each
Formatted single density .... 700K bytes

SHUGART SA860 DS/DD
Half-Height 8"

A double sided half height 8" high speed disk drive DC only operation
Same as used on Zenith Z-100
1 YEAR WARRANTY $495 each 2 @ $475 each
Formatted .... 1.25 megabyte
Track to track 3ms

SHUGART SA455 DS/DD
Half-Height 48TPI
A double headed minifloppy disc drive with up to 320K on-line storage capacity. Plug compatible with any standard 5¼" drive. Electrically the same as TM-100-2 and FDD-211-5
1 YEAR WARRANTY $245 each
Formatted ...... 320K bytes, extended 360K bytes
Track to track 6ms

HEATH ZENITH H88, 89 or 90 TWOET SYSTEMS
Dual internal half-height disk drives
Now you can replace your built-in drive with two double-sided, double or single density, internal half-height drives in either 48 or 96tpi format, with all hardware, cables, power connector adaptors, and documentation included. Our double-sided 48tpi works perfectly as a single sided right out of the box. You can even use this system with your H-17 controller. And we have the software drivers (at additional cost) so you can run out 48 or 96tpi double-sided, single density drives on it!

TWOET 455	TWOET 465
2 SHUGART SA-455	2 SHUGART SA-465
half-height	half-height
48tpi double-sided	96tpi double-sided
$595	$695

Both models are shipped complete with all hardware, shielded metal mounting plates, data cable with chassis connectors, and complete documentation.
WHAT TO DO WITH YOUR INTERNAL DRIVE: For only $60 extra plus shipping, we'll send you a single 5¼ case with power supply and data cable — ready to receive your SIEMENS internal drive! A regular $80 value. The external chassis disk I/O connector comes with your TWOET system

W.S.T. DISK DRIVES (formerly Siemens)
W.S.T. FDD-100-5B4 Same model used in Heath computers. Added "Flippy" operation feature. Works with almost any SA-400 compatible system. RS Model 1, North Star, S-100 and more. $235 each
C3-$195 each (with Shugart type Bezel)

W.S.T. FDD-211-5
Dual headed 5¼". Records data in single or double density, using hard or soft sector techniques. An exact TM-100-2 replacement. Use in Northstar and IBM, or any system using dual head 48 tpi drives. Same as COMPAQ. $265 each.
NUMBER OF HEADS 2
FORMATTED DATA CAPACITY .... 320K bytes extended 360K bytes

W.S.T. FDD-221-5
A double headed, 5¼", 96 tpi (80 track) disk drive. Capable of hard or soft sector, single or double density, it's an exact replacement for the TANDON 100-4 $335 each
2 @ $295 each

[redacted]

Increase your on-line storage capacity by 2.5 megabytes with Our new 8" double sided half height disk drive. Styling matches IBM-PC. Utilizes Shugart half-height 8" double sided disk drives. Allows reading CP-M data files with optional patch.
FD-PC8 System $1270
Maynard Controller $245
(Allows use of two internal 5¼" and the two outboard 8" system. Add $70 for parallel)
JFormat $50
JFormat-2 .... $50
We have half-height mounting kits for IBM and COMPAQ computers.

APPLE HALF-HEIGHT DISK DRIVES Call for price

ENCLOSURES

MODEL	CONFIGUARTION	STACKING	DIMENSIONS	ALSO AVAILABLE	PRICE
DH5A&T	2 standard 5¼	horizontal	17" L x 12"W x 5"H	external chassis connector/ blank plates	$125.00
SV5A&T	1 standard 5¼	vertical	11½ L x 3½ W x 6" H	vertical 5¼" case for 2 half-height drives	$55.00 or $75.00 for ½ height
DV5A&T	2 standard 5¼	vertical	11½"L x 6"W x 7" H	—	$85.00
D5HHHA&T	2 half-height + space for single board computer	horizontal	17" L x 12"W x 3½"H	blank plates ext. chassis conn.	$125.00
5SHA&T	1 standard 5¼ or 2 half-height drives	horizontal	12"L x 8"W x 4"H	blank plate ext. chassis conn	$95.00
5SHHDA&T	1 standard or 2 half-height hard disks	horizontal	12"L x 8"W x 4"H	blank plate	$165.00

8" ENCLOSURES
All 100% our design, these 8" enclosures feature a front panel power switch designed with 1" clearance over the drive to accomodate a big board computer or a hard disk controller. All 18 gauge metal construction with DB 25 cutouts on the rear panel. CP-206 supply mounting holes, which are standard for the 8" drive industry

MODEL	CONFIGUARTION	STACKING	DIMENSIONS	ALSO AVAILABLE	PRICE
DH8A&T	2 standard 8" (such as SHUGART 800-R series or SIEMENS FDD-100 series)	horizontal	21"L x 17¼"W x 6½"H	ext. chassis conn.	$295.00
SH8A&T	1 standard 8" or 2 half-height drives + space for single board computer	horizontal	16"L x 12½"W x 6¾" H	blank plates ext. chassis conn	$285.00
DHHH8A&T	for SHUGART TANDON 848 or similar 8" half-height designs	horizontal	20.5 L x 17 W x 4 H	blank plates ext. chassis conn	$320.00
FDPC8	for SHUGART 810-860 matches IBM-PC or Zenith systems	horizontal		blank plates	$320.00

MULTIDISPLAY
For IBM-PC, contains both mono and color display plus printer port, all on one card $575
PGS MONITOR
The best RGB monitor going $475

SANDSTAR MODULES FROM MAYNARD
Sandstar Serial Port Module

Totally compatible with software written for IBM Asynchronous Adaptor. Connects to MODEM, serial printer, or any standard RS232-C interface device. Port may be configured as Serial Port #1 or #2. Can use IBM diagnostics. MSE1301 . $105.00
SandStar Clock Calendar Module
Features clock and calendar with battery backup, which runs when PC power is turned off or plug is disconnected. Correct time and date loaded each time system is powered up. Software included. MCL1303 . $85.00
SandStar Parallel Port Module
A Centronics compatible I/O port. Use as general purpose I/O port or connect to printer. Utilizes same type connector and pins as IBM Parallel Printer Adaptor, and is 100% compatible with its software. Configure as Port #1 or #2. Can use IBM diagnostics. MPA1302 $75.00
SandStar Memory Module
Use with SandStar Memory Card. Expands memory by 320K bytes for 640K bytes total system memory. Uses only one IBM expansion card. No configuration required before plug in.
Module may be purchased with any 64K increment and easily expanded to 320K. Electronic disc and print spooling software are also available.

MMOD000	0K	$115.00
MMOD064	64K	$205.00
MMOD128	128K	$300.00
MMOD192	192K	$390.00
MMOD256	256K	$485.00
MMOD320	320K	$580.00

SandStar Game Adaptor Module
Attach up to 4 paddles and 2 joysticks to your IBM PC. Can be used for general purpose input, with 4 digital and 4 analog inputs. 100% compatible with IBM PC software. Uses same type 15 pin "D" subminiature I/O connector as the IBM Game Control Adaptor

Maynard Electronics Multi-Function Memory Expansion Board
Adds form 64K bytes to 256K bytes to your IBM-PC. Expandable with either 1 or 2 optional asynchronous serial (RS232-C) ports. Engineered for total compatibility with IBM I/O specs. Parity generation and detection included. Ready to plug into 64K byte systems. Optionally available with 1 or 2 RS232-C ports with 20mA current loop. 100% compatible with IBM hardware and software, and may be used to connect your computer to a modem serial printer or other devices with computer interface. Board ports may be enabled or disabled and assigned as COM1 and/or COM2.

MMF 1000	0K	$210.00
MMF 1064	64K	$305.00
MMF 1128	128K	$410.00
MMF 1192	192K	$510.00
MMF 1256	256K	$615.00
MMF1SER (with one serial port added)		$100.00
MMF2SER (with two serial ports added)		$160.00

(No parallel available)

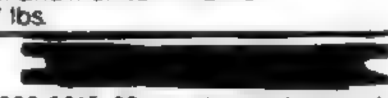
Maynard Dish Controllers Description	RET
MODFDC (Controller w/mod ports)	$265
FDC8 (8" Controller)	$245
FDC 5¼ (5¼" Controller)	$195
FDCPARALLEL (Contr. and para ports)	$275
FDCSERIAL (Contr. and serial ports)	$285
FDC8 PARA (8" Contr. and para ports)	$315
HDM (hard disk module)	$495

CONTROLLERS Magnolia Micro-systems for the H-89 & Z-90 Double Density Disc controller including CP/M 2.2
Complete hardware & software support for:
- Four 5¼" and Four 8" single or double sided drives
- 48 TPI (40 track) drives
- 96 TPI (80 track) drives
- 3-5¼" drives supported by Heath Zenith controller H-17

This package includes:
- double density controller card
- CP/M 2.2 on either 5¼" or 8" media
- new I/0 decoder and monitor PROMs

Shipping weight 7 lbs.

DATA CONNECTORS



50 pin edge card 609-5015
34 pin edge card 609-3415
50 pin inline chassis 609-5016
34 pin inline chassis 609-3416
50 pin inline end connector 609-5001M
34 pin inline end connector 609-3401M

POWER CONNECTORS

stacking bracket for 5¼" or 8" half-height drives SB5 or SB8
SA 810/860 DC power C1115
SA 850/851 FDD-200-8-AC 8" double sided C1114
8" AC connector standard, single sided C1113
AC socket 8", single sided C1120
5¼ DC connector C1116
5¼ DC socket C1119
PCB-8" DC C1122
free-standing 8" DC connector socket C1121
8" DC standard C1112

We sell many other disk drive models too numerous to list here. We encourage you to call for our latest pricing and catalog. Due to production deadlines, prices are 60 days old. Please call! Dealer inquiries invited. In our 5th year!
Prices and specifications subject to change without notice.
MasterCard, VISA accepted. NJ residents, add 6% sales tax.
Shipping charges: $3.00 first 4 lbs., $.40 each additional lb.
COD charge $5.00.
TOLL FREE ORDER LINE: 800-223-0306
In NJ, Call: 609-799-4440 9.00 am-5.30 pm est.

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best positioned. It, as you will see in these pages, has spawned an entire add-on industry of its own—a virtually unprecedented phenomenon.

Representative as they are of the software and hardware sides of the business, these people are very much in charge.

Redefining "Hacker"

Lately I've also been thinking about the word *hacker*. What does it mean to you? It probably depends on when you first started using or reading about microcomputers and what publications you read. There are some who are proud to be called hackers and others who bear the name with shame. Back in the early 1970s, before computer kits first emerged, there were two pinnacles of achievement for electronics hobbyists. The first was amateur radio, and the second was high-fidelity audio. Anything else was just a quirky offshoot or some kind of specialization. There were hobbyists who collected applications for a single integrated circuit. The 741 op-amp (operational amplifier) and 555 timer chip were two of the most popular cult circuits, in addition to having a strong following in the electronics industry. The hobbyists who scoured the magazines and fiddled with circuits long into the night came up with many useful and interesting contributions to the body of applications. I knew one guy who, after studying the complex analog circuitry of an electronic fuel injection system, made a functional duplicate with just two 555 chips. Did he try to market it to Bosch? No, he just did it for the fun of it—which is the essence of hacking.

Before there was such a thing as a business microcomputer, computer hobbyists did the same thing hobbyists have always done: They stayed in touch by modem and by phone and met at the shows. There were so few knowledgeable users at the outset that they knew one another.

Within the seemingly tight-knit fabric of the hacking community, though, there were a few slubs. I remember the shock and incredulity with which one of the technical magazines reported the first equipment theft from a budding West Coast computer store. Welcome to the real world. Back then there were the guys who were obviously more interested in computers than interpersonal relationships, or, for that matter, personal hygiene. The true hackers weathered these storms and managed to escape with some dignity intact.

Telecommunications has always been of interest to electronics hobbyists. Most of us, when we were kids, knew how to cheat a pay phone out of a nickel or get around some of the early long distance dialing codes. Some made beating the phone company into an avocation—others, into an obsessive occupation.

Then timesharing via asynchronous terminals started gaining in popularity and the hobbyists who were so inclined had a new challenge against which to test their mettle. The majority of the incursions against timesharing systems were innocent, with occasional lost files caused by clumsy snooping.

Although many of the unauthorized accesses were innocent, they were still improper, if not illegal. Most of the true hackers moved on, looking for new electronic worlds to conquer, perhaps in satellite TV or robotics.

Those who remained to plunder online systems for their informational booty or cause mischief were, in a word, criminals. Not hackers. Not hobbyists. Criminals.

The press always looks for convenient handles, abbreviations, and trigger words to describe people making headlines: Reds, Bircher, xxx, yyy. Saying volumes with one word is an art form, but practitioners of this art don't particularly care who they hurt. So it was all too easy to stretch the word *hacker* to cover this new kind of criminal, creating an implicit syllogism of the most repellent kind: All computer criminals are hackers, therefore all hackers are criminals.

In one stroke, the pundits and editors double-defined the word, rendering it useless. Now both camps are in the market for some new words, one that succinctly characterizes "knowledgeable computer enthusiasts who may be professionals or hobbyists" and another that means "a criminal who specializes in invading telecommunications systems."

In some ways, however, the hackers deserved what they got at the hands of the media. They did nothing to engender respect or affection for their genre. Also, if you look at the sociology of programming, you can make the case that programming in assembly language, the lingua franca of hackers everywhere, is an antisocial act. In polite society you're expected to program in top-down structured, high-level languages. Iconoclasts and rugged individualists need not apply. A data processing department functions best with worker bees, not lone wolves.

Meanwhile, where have all the hackers gone? The ones that is, given the prejudices of the press, who have seemingly managed to stay out of jail? Many of them are running highly successful companies. You know their names; they're some of our best advertisers. Others, unsuited to the front office, are the mainstays of the program development staff. Still others are self-employed consultants, doing the balancing act between entrepreneurialism and working for others.

Some things, though, never change. I've long been a (sometimes lapsed) member of the local computer club and I recently attended a meeting for the first time in a couple of years. Instead of the old 8080-CP/M user group, though, I went to the IBM PC meeting. To my surprise, I knew about half the people in the room. Not from my PC contacts, but from the 8080 days. All the old-timers had simply moved upstream to the PC. There were lots of new faces, too, including IBM systems engineers, doctors and executives.

I'm pleased to report that what I'd like to call hacking is still alive and well at the user group meetings and in our own User-to-User column. I just don't want to inadvertently insult any of the home users, businesspeople, or professionals who have the courage to dig a little deeper. ■

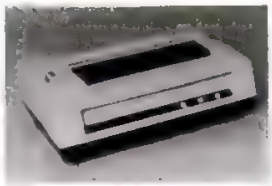
Plain Talk About Printers...

DOT MATRIX

There've been some big changes in IBM-PC printer compatability. Okidata's new Plug-n-Play ROMs (see below) make a Microline 92, 93 or 84 fully compatible with the IBM-PC, screen dump graphics & all. If you're interested in full compatability, that's the package to get. We expect that other printer manufacturers will offer similar upgrades shortly.

C. ITOH

Prowriter



C. Itoh's **Prowriter** (120 cps) features 10, 12, & 16 cpi, a proportional/correspondance quality font, double strike, double-width, sub/super scripts, dot graphics (160 x 144 dpi). The **Prowriter 2** is the 136 column version.

Prowriter **$399.88**
Prowriter 2 ..... **$719.88**

EPSON

RX/FX Series

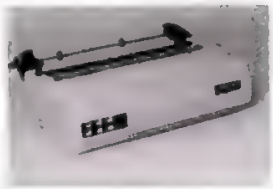
The **FX-80** (160 cps) has a correspondence font, 10, 12 & 17 cpi, italics, double-strike/width/emphasis & dot graphics, plus a 2K buffer. Friction & pin feed is standard; the adjustable tractor is optional & cost extra. The **FX-100** is the 136 column version & includes the adjustable tractor.

The **RX-80** & **RX-80 F/T** (100 cps) are upgraded versions of the MX Series.

Epson FX/RX ..... **$CALL**

MANNESMANN TALLY

MT-160 L/180 L Spirit



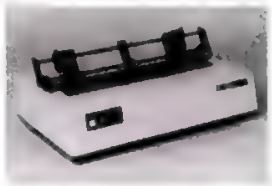
The **MT-160 L** (160 cps) features 10, 12, 17 & 20 cpi, a correspondence font, italics, enhanced/boldface print, double-width, sub/super scripts & underline, friction/tractor feed. Parallel & RS-232C interfaces standard. The **MT-180 L** is the 136 column version.

The **Spirit** (80 cps), Tally's new, low cost draft printer, has 10, 12 & 17 cpi fonts, italics, friction/tractor feed, and a unique square-wire printhead. 80 columns & parallel only.

MT-160 L **$649.88**
MT-180 L **$849.88**
MT-Spirit **$329.88**

OKIDATA

Microline Series



The Microline 92 (160 cps) is ideal for word processing. It features 10, 12 & 17 cpi, a correspondance font, double-width, emphasis/boldface, sub/super scripts, underlining, pin/friction feed (tractor is optional on the **92**) & dot-addressable graphics (120 x 144 dpi). The **93** is the 136 column version. Parallel interfaces are standard; the RS-232C interface is optional.

The **Microline 84** (132 col) is the Step 2 version, featuring 200 cps at 10, 12, & 17 cpi (w/double-width), all with a correspondance mode & dot addressable graphics. Parallel or RS-232C interfaces available.

A new PROM called **PC Plug-n-Play** turns a **92, 93** or an **84** into an IBM-PC compatible printer, with full capabilities. You will sacrafice a few features (like 12 cpi) but the PROMs are worth it if total compatibility is your goal.

The **Microline 82A** (120 cps) is a data crunchers. Features 10 & 16 cpi (5/8 double-width). Dot-addressable graphics are optional. The **83A** is the 136 column version.

Microline Series ..... **$CALL**

PANASONIC

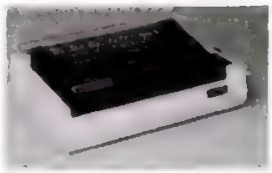
KX-P1090

A smart entry by Panasonic, the **KX-P1090** (80 cps) features 10, 12 & 16 cpi, italics, double-width, half-width, enhanced/bold print, dot graphics (120 x 144 dpi), friction/tractor feed & a 4,000,000 character ribbon. The Epson-compatible escape code sequences make it easy to install. Quiet printing & a sharp design make it ideal for home or office. Nationally serviced by Panasonic.

KX-P1090 ..... **$339.88**

STAR MICRONICS

Gemini 10X/15X Delta 10/15



The **Gemini 10X** (120 cps) features 10, 12 & 17 cpi, italics, a correspondence font, double-width, emphasis/boldface print, sub/super scripts, underlining, graphics (120 x 144 dpi), a 1K buffer & friction/tractor feed. The **Gemini 15X** is the 132 column version.

The **Delta 10** (160 cps) features both parallel & RS-232C interfaces, & an 8K buffer, plus all the 10X features mentioned above. The **Delta 15** is a 136 column version.

Gemini 10X **$309.88**
Gemini 15 ..... **$459.88**
Delta 10 ..... **$529.88**
Delta 15 ..... **$CALL**

TOSHIBA

P1350

An exceptional printer that produces the best near-letter quality we've ever seen. The **P1350** prints at 192 cps (100 cps in near-letter quality), & features 132 columns, 10 & 12 cpi (plus double-width) & a near-letter quality font with proportional spacing. It has all the sub/superscripting features you'd expect, plus dot graphics (180 x 180 dpi). Parallel or RS-232C interface (specify).

P1350 ..... **$1759.88**

Other Dot Matrix Printers We Carry

ANADEX

DP-9501 ..... **$1189.88**
DP-9620 ..... **$1259.88**
DP-9625 ..... **$1389.88**
WP-6000 ..... **$2279.88**

DIABLO

Series 32 ..... **$1049.88**

IDS

Prism 80 ..... **$1079.88**
w/4-color **$1439.88**
Prism 132 ..... **$1239.88**
w/4-color **$1669.88**
MicroPrism **$529.88**

INFORUNNER

Riteman **$349.88**

LETTER QUALITY

The new, low-speed letter-quality printers are making quality affordable. And the high-speed models are coming down in price too. Still, get a dot matrix printer for drafts & as a backup.

C. ITOH

A10 Starwriter F10 Starwriter Printmaster

The C. Itoh **Starwriter** (40 cps) features 10 or 12 cpi, sub/super scripts, underlining, 6/8 lpi, 1/48" line feed, 1/120" horizontal resolution. It uses Qume code & Diablo wheels & ribbons. The **A-10 Starwriter** has the same specs, but it prints slower (20 cps). The **Printmaster** has the same specs, but it prints faster (55 cps). Both the **Tractor Feed** and the **Sheet Feeder** fit all three models.

A-10 Starwriter **$609.88**
F-10 Starwriter **$1219.88**
Printmaster **$1569.88**
Tractor Feed **$289.88**
Single Bin Sheet Feeder (A10/F10) **$619.88**

SILVER REED

EXP-550/500

The Silver Reed **EXP-550** (17 cps) is a 132 column letter-quality printer with 10, 12 or 15 pitch, sub/superscript, underlining and **true** Diablo 1610 emulation, making it compatible with most word processing software. It's friction fed, and it features a page injector; an optional tractor is also available.

The **EXP-500** (12 cps) is a 100 column letter-quality printer with the same specs as the **EXP-550**, but slower and without page inject.

EXP-550 (Parallel) **$699.88**
EXP-550 Tractor **$139.88**
EXP-500 (Parallel) **$469.88**
EXP-500 Tractor **$129.88**

NEC

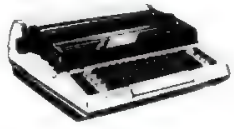
Spinwriters

The new **2000** Series are slower (20 cps), but they've retained all the qaulity of the 3500/7700 Series. Uses the same thimbles & ribbons.

2010/2030 ..... **$879.88**
2050 ..... **$999.88**
3530 ..... **$1639.88**
3550 ..... **$1899.88**
7710/7730 ..... **$2159.88**

SMITH-CORONA

Messenger



The **Memory Correct III Messenger** (the full name) is ideal for the home or small office. It combines the features of an electric typewriter ***and*** a letter-quality printer. It features 12 cps, 3 pitches (10, 12 & 15), variable line spacing, 10.5" writing line, backspacing & auto-correction. It comes complete with parallel/serial interface.

Memory Correct III Messenger **$629.88**

Other Letter Quality Printers We Carry

COMREX

CR-1 ..... **$849.88**
CR-1 Tractor **$104.88**
CR-2 ..... **$509.88**
CR-2 Tractor **$94.88**

DIABLO

620 (RS-232C) **$999.88**
630 (PC) **$1979.88**

QUME

Sprint 11+ **$1539.88**

MONITORS

NEC

JB-1205/1201M

Slick design & slick specifications. The NEC **JB-1205M** is the amber version. The **JB-1201M** is the green screen. Both offer 80 columns on a 12" diagonal screen, with an 18-20Mhz bandwidth and a crisp, clear display.

JB-1205M (12" amber) **$179.88**
JB-1201M (12" green) **$169.88**

USI

PI-3 (12" amber) **$189.88**

AMDEK

300G (12" green) **$149.88**
300A (12" amber) **$164.88**
310A (12" amber) **$199.88**

PRINCETON GRAPHICS

HX-12

The **HX-12** is one of the finest RGBs available. 16 colors (using NEC's tube), 690 dots by 240 lines (480 interlaced) & 15MHz bandwidth. Comes with its own cable.

PGS HX-12 ..... **$499.88**

QUADRAM

QuadChrome

The **QuadChrome** has the same spec's as the HX-12. Same price too.

QuadChrome **$509.88**

Quadram Video Boards

QuadColor-1 ..... **$199.88**
QuadColor-2 ..... **$219.88**

USI/PARADISE

MultiDisplay

Supports 32K graphics, with composite, RGB, PC monochrome display *and* a parallel port.

MultiDisplay **$479.88**

TECMAR

Graphics Master

192K for RGB or composite display, supporting 480 non-interlaced RGB output.

Graphics Master **$579.88**

EAGLE COMPUTER — **COLUMBIA DATA PRODUCTS, INC.**

We are now offering both the **Columbia MPC** and the **Eagle PC-2** to our customers. These machines are IBM-PC compatible, with 128K RAM on board, two 320K disk drives, one parallel port, two RS-232C ports and bundled software packages.

The **Eagle PC-2** includes MS-DOS, CP/M 86, plus Eagle-Writer and EagleCalc. The **Eagle PC-2** also includes a monochrome monitor, with a resolution equal to the PC monitor. The **PC-2**'s ideal for first-time users. It's easy to learn & easy to use.

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Letters To PC

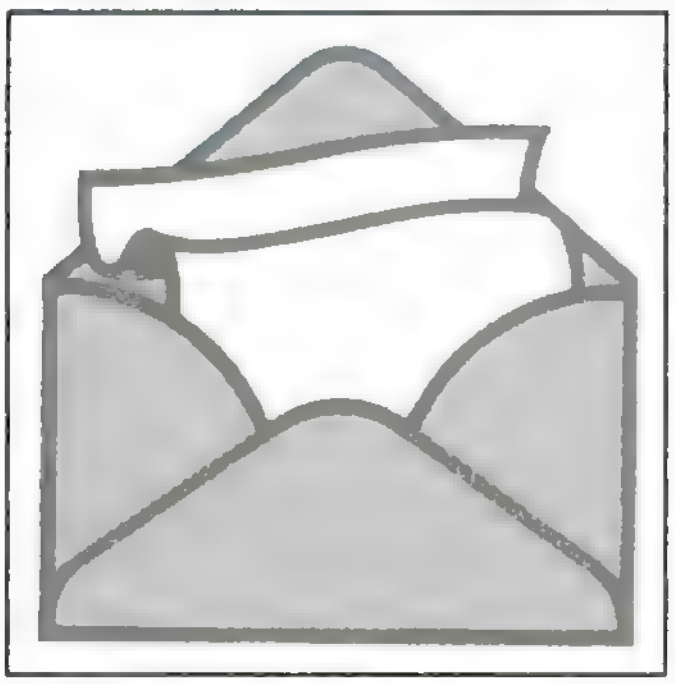
Videodisk Controversy

Ariel Schwartz's article on using a PC with a videodisk player was excellent ("There's A Videosdisk In Your PC's Future," *PC*, Volume 2 Number 6). I speak as the owner of several PCs and a former owner of several videodisk players. But Schwartz made one minor, and, as far as I'm concerned, one major error.

First, he states that North American Phillips developed the laserdisk technology. This is about 15 percent true. Phillips, which bought its North American consumer electronics business in 1980, developed some of the laserdisk technology during the 60s and 70s in Europe. But significant contributions to laserdisk knowledge were amassed by Sony and MCA; every commercial laserdisk player I know about employs patents originally filed by all three of these companies.

Second, Schwartz's description of how a videodisk player works leaves out what is to me the most interesting facet of its operation, and certainly the most relevant to proud computer users. The pattern of pits on a videodisk is a simple binary code, very similar to the code used on computers. The pits represent an FM signal, encoded with the audio and video information necessary to generate a TV picture. The distance between two pits represents the width of a given wave in the FM signal. Since FM waves do not vary in height or amplitude, the width of the wave is all that needs to be depicted.

When the laser hits a pit—and there are billions, not millions, on each side of a disk—it is reflected back and eventually reaches the photodiode. But contrary to the article, the diode does not translate light into an image for viewing. All it does is convert the light back into electricity. That electrical signal is sent to an FM decoder, which does the trickiest job



of all: translating the on again-off again signal levels into a reconstructed FM signal and then creating audio and video from the FM signal. The laser part is a snap compared to encoding and decoding a TV signal into and out of the little pits and their FM scheme.

R.A. Goodenough
Pittsfield, Illinois

Ariel Schwartz replies:

Phillips is still regarded in the interactive video industry as the major developer and driving force behind laser technology. As far as FM encoding goes, I felt that the details of its functioning were too technical to include in the article.

I feel that a number of points in Ariel Schwartz's article about videodisks warrant further comment.

First, the author states that "laser videodisk players can independently access any one of 108,000 frames on a videodisk." This is a little misleading. Actually, interactive videodisks, known as CAVs (constant angular velocity) in the industry, contain only about 54,000 accessible frames, since they are designed to play a maximum of 30 minutes per side.

If a player could be developed to flip the disk over, then this could be increased to 108,000, though with a greatly increased access time. Consumer-type disks are generally pressed in the CLV format (constant linear velocity), and are designed to play up to 60 minutes per side—108,000 frames. Unfortunately, due to the varying rotational speed in the CLV process, single-frame access, slow motion, and other interactive modes aren't readily obtainable with these disks.

In addition, the author makes a grievous error in stating that "home videocassette players . . . parking in 'still' mode for only 30 seconds can tear a hole through the tape." This is a common misconception. Most videotape manufacturers claim that their products can last up to 60 minutes or more in the still-frame mode. In addi-

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tion, practically all current Beta and VHS VCRs revert to the stop mode after pausing for more than 5 minutes or so. Even 5 minutes of continuous still-framing causes no visible degradation in the picture, let alone a ragged hole in the tape's oxide surface or polyester backing.

On the subject of picture quality, the article gives the impression that laserdisks "produce a video image far superior to that of any home videocassette player." While this may be true in theory, in my experience I've found disks to be superior only for resolution and convenience, not color quality or overall image definition. Most laserdisks I've seen are noisier than the best prerecorded tapes, and rarely exceed the quality of good off-air reception.

Marc Wielage
Los Angeles, California

Ariel Schwartz replies:
There are indeed 108,000 independently accessible frames in a laserdisk. I never stated that they could all be accessed at once.

I have plenty of worn tape at home prove Wielage wrong about how tape players won't tear a hole in a tape in still mode.

In Praise of Criticism

Congratulations to Stephen Manes and *PC Magazine* for the hard-hitting article on *VisiWord* ("VisiWord: What You See Is Almost What You Get," *PC* Volume 2 Number 6). If a piece of software or any other equipment deserves criticism, we deserve to hear about it; if it warrants praise, we want to hear that as well. As for Peter Norton, he can now stop mulling and return to writing. We can't get away from our subjectivity, so let's hear the criticism along with the subjective reasoning to back it up.

Alan Mason
Fredericton, New Brunswick

Each month I am tempted to cancel my subscriptions to various magazines because of the aren't-we-all-good-old-boys articles and reviews that gloss over the frustrations of inadequate, poorly supported, or too hastily marketed products. This problem seems finally to have been confronted in the "exchange" between Peter Norton and Greg Weissman ("To Rate Or Berate" and "Mr. Norton, I Beg To Differ," *PC*, Volume 2 Number 6).

I totally agree with Weissman that Microsoft and IBM should not be faulted just because they release products that contain bugs. They are producing useful products that help me get my work done. If those products can be in my hands a little sooner, I will gladly tolerate a few bugs—provided that the bugs are honestly acknowledged and that users assisted in correcting or working around them. I don't even mind paying for updates.

Unfortunately, Microsoft and IBM show no such honesty or concern for their customers—witness the condition of the Fortran and BASIC compilers. My vote is solidly with Norton, whether he's "fair" about it or not. If big companies won't support their own products, then the users of those products need all the help they can get from anyone willing to provide it.

I suggest an answer to Norton's soul searching: the "benefit of the doubt" accorded a product being reviewed should be in proportion to the responsibility that company takes for its products.

To take an example from the November issue of *PC*, Orchid Technology and AST research have proved competent and helpful in handling questions about their network products, such as what a program must do to identify which networked PC it is running on. Microsoft and IBM, on the other hand, have left each user to figure out the keyboard key reassignment procedure under DOS 2.0. Both are instances of faulty documentation, and in both cases it is a reviewer's responsibility to note the defect. But Orchid and AST deserve praise, while IBM and Microsoft should be berated.

Defects in operating systems, languages, and compilers are especially important because so much else depends on their performance. If Norton can provide hard information leading to more effective use of such products, then he will be performing a valuable service.

Bob Penny
Boulder, Colorado

Peter Norton's article, "To Rate Or Berate" (*PC*, Volume 2 Number 6), raised a series of questions that all seem to have a single answer: honesty in a tone of moderation. I think any reviewer should give a complete picture of the product, warts and all. For those made by one-man shops, the reviewer might want to include a little more enthusiasm for the positive points but there is no justification for overlooking the flaws.

Norton's article on DOS 2.0, which someone told him was "savage," is not a case in point. The article was clearly a critique, not a review, and therefore could not be expected to dwell on all the things that are good.

D.E. Vail
Houston, Texas

Where Do You Go?

In Lisa Harbatkin's article "Where Do You Go When The Lights Don't Glow?" (*PC*, Volume 2 Number 5), she quotes Walter Briggs of IBM as saying, "Our emphasis is to provide the dealers with the training and resources and backup and parts and logistics to go ahead and do support better than anyone else in the industry."

To what training is Walter referring? It cannot possibly be IBM service training; there is absolutely no

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technical knowledge provided at those classes. They do not prepare a technician to adequately service IBM products beyond the field replaceable unit (FRU) level.

Harbatkin goes on to say that all the parts in a PC can be replaced as FRUs. This is true—as long as the unit is in warranty. Once the system is out of warranty, the costs of FRU repair can exceed the cost of the unit in question. For example, the replacement cost of a floppy disk drive head assembly from IBM Is $267, but we all know that a new Tandon or CDC drive can be purchased for less than that.

IBM does not and will not teach anyone to repair a FRU, nor will IBM repair most out-of-warranty FRUs itself. This means that if your disk drive, power supply, drive adapter card, parallel card, comm card, SDLC card, bisync card, or monochrome display develop a problem and you do not have a service contract, your local authorized dealer does not have the training to repair your unit easily and inexpensively.

When IBM wakes up and begins to provide dealers with "the training and resources and backup and parts" to repair its customers' equipment easily and inexpensively, both in and out of warranty, then a substantial flaw in dealer support will be corrected.

J.B. Howard
Middleville, Michigan

Lisa Harbatkin replies:
My understanding is that IBM has settled on the FRU approach as the most efficient and cost-effective means of getting the machine functioning and back to its owner in the shortest possible time. No, it's not perfect. But what would be the trade-off in time, effort, and money spent (in ultimate cost to the user) if IBM trained every technician at every authorized dealership and repair station to do the kind of repairs that are done to the FRU when it gets back to central IBM facilities?

The user gets a new or rebuilt part, and the nonfunctioning part goes back to IBM and winds up in someone else's PC after it's been repaired to Big Blue's quality control standards. The process is the same, in or out of warranty. I believe I also make clear that if something happens to your machine when it's out of warranty and you don't have a service contract, you're going to get soaked.

Thanks a Dot

A belated thanks for the October articles on *WordStar* and the Okidata 92 ("Why We Like WordStar" and "Interfacing With Okidata," *PC*, Volume 2 Number 5). Now that my ^P functions all work properly, I was wondering if you or your readers had figured out how to get the dot commands of line height and character width to work with a Compaq.

William Rubin
Cleveland Heights, Ohio

Dot commands are not a function of the computer that WordStar runs on. They require that WordStar be properly patched for the printer in question. The line height and character width commands, in particular, are oriented toward letter-quality printers in which character printing and horizontal and vertical motion can be completely separated. This may not be possible on many dot-matrix printers.—Ed.

MisAPLication

I was pleased to see an article on APL in your October issue ("Two Implementations of APL," *PC*, Volume 2 Number 5). Once I began using APL, I realized I would never again program in step-by-step languages. APL surely deserves more attention from the computer media, and I hope your article is the first of many.

I was disappointed to see so many errors, though. When you list a BASIC program, you use typewriter characters instead of your usual typeface, and each character has the same width. APL should be dealt with in the same manner.

In Figure 1, the headings for the execution times were obviously wrong. What you meant was

```
IBM APL APL*PLUS APL*PLUS
          With 8087 W/O 8087
```

There were also nine typographical errors in Figure 1.

Finally, a factual error. APL*PLUS does not confine Epson dot graphics to less than half a page in width, as the article states. APL*PLUS can send Epson dot graphics to an Epson FX-80 to print 106 APL and ordinary characters in the standard 8 inch printed width.

I look foward to more articles on APL, with genuine APL typed symbols, proofread by someone familiar with the language.

Joel Aaron
San Francisco, California

Our apologies to readers who had trouble with "Two Implementations of APL," and to the author, Robert S. Lee, as well. Lee pointed out that a whole row was left out of the benchmark table relating to the matrix divide operation in Figure 1. The factual error Aaron mentioned is due to a proofreading error.—Ed.

A Time to Reflect

Now that *PC Magazine* is embarking on a new biweekly format, you have an excellent opportunity to re-examine your goals for the magazine. As a potential advertiser and a current reader, I'd like to put in my two cents.

I think increasing the frequency is a good idea; the magazine is unmanageable in its current form. Neither the ad copy nor the editorial material gets proper exposure.

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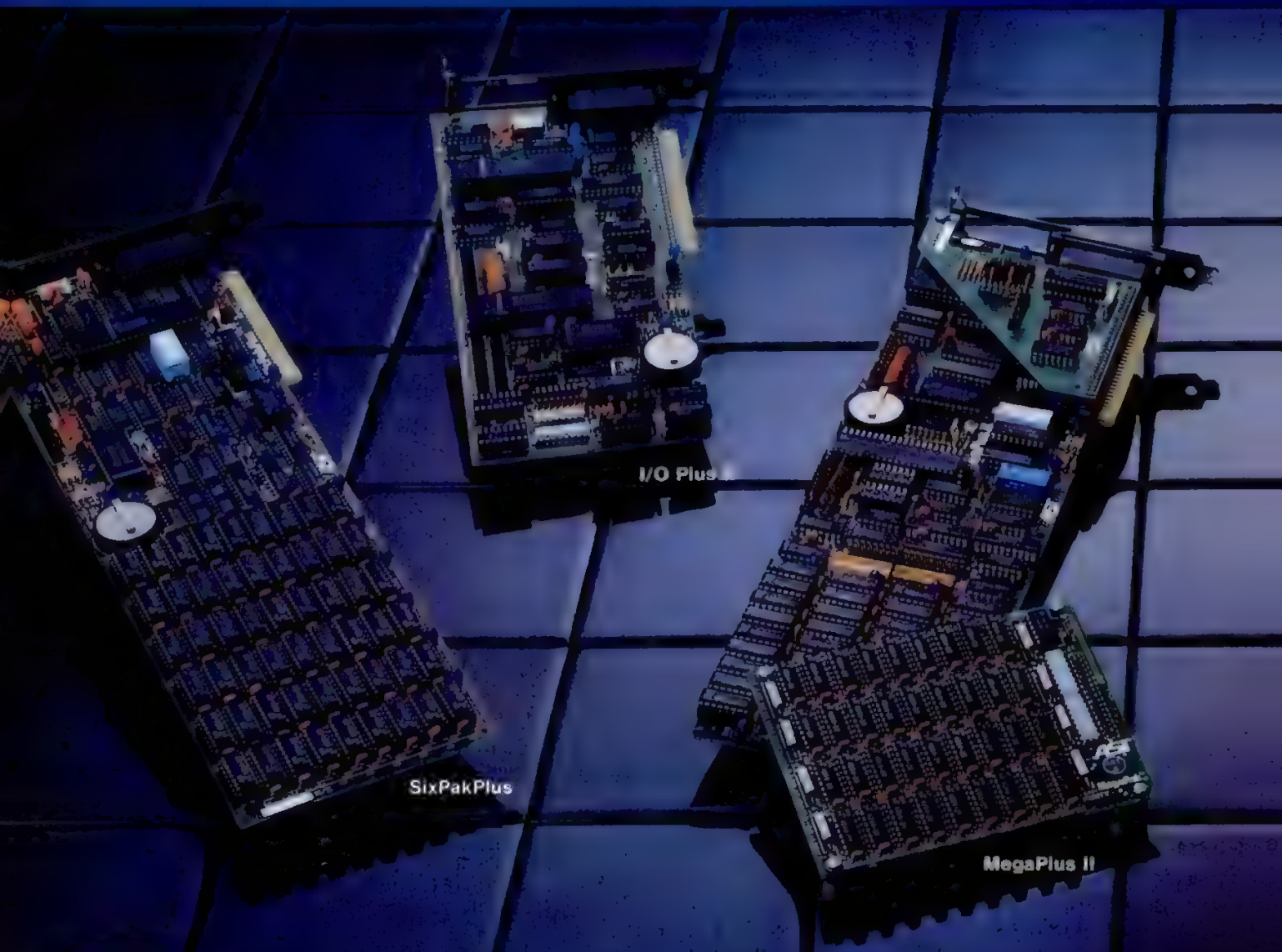

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MegaPlus II	X	X	X	X	X	X	X
I/O Plus II		X	X	X	X	X	
ComboPlus	X	X		X	X		
MP Expansion	X						

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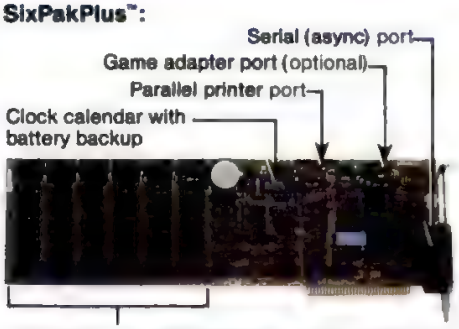

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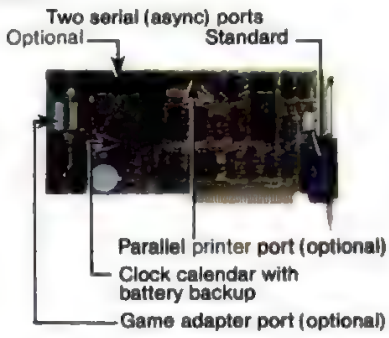

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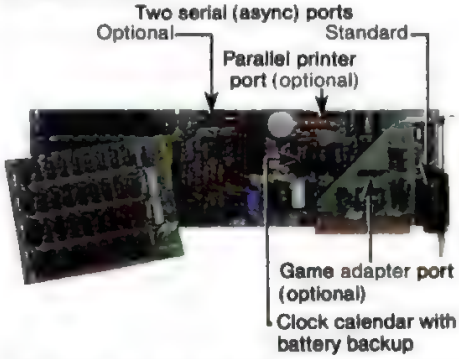

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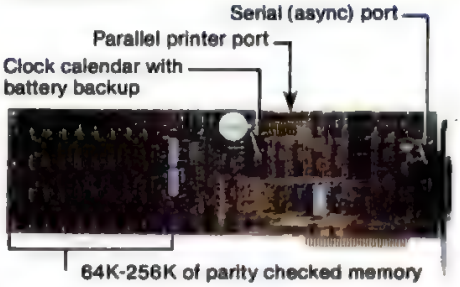
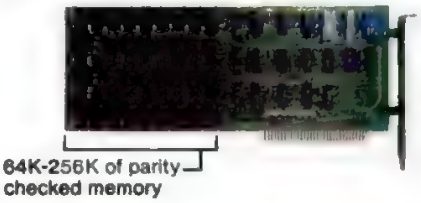


MP Expansion Memory:



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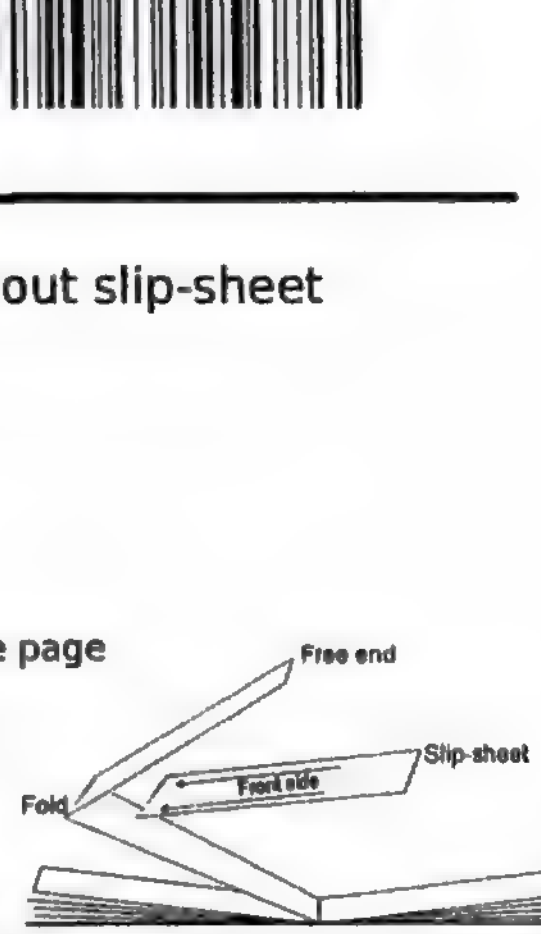

Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Inverted Back

1. Follow instructions on the other side

GbsSlipBack-001B

Back

1. Follow instructions on the other side

• **Parallel Ports** — The parallel port is used for connecting a parallel printer to your PC. A parallel printer typically uses a dot-matrix output which is suitable for high-speed draft quality printouts. The PC allows for the installation of up to three parallel ports.

• **Clock-Calendar** — With the on board battery, the clock-calendar feature will maintain the correct date and time, even when the PC is turned off. This feature eliminates the need for typing in this information each time you power up your computer.

• **Game Adapter** — The game adapter port allows you to connect an IBM-type joystick to your PC so you can play the multitude of arcade-quality games which take full advantage of the PC's graphic capabilities. Or you can use the joystick input for other applications by writing your own programs.

• **SuperPak™** — Every AST Research Multifunction Board comes with an AST SuperPak diskette containing programs for setting and accessing the clock, as well as SuperDrive™ and SuperSpool™, the most powerful RAM disk and print spooler available for PC-DOS. With SuperDrive you can use your PC's memory for simulating one to four floppy drives, from 20K to 360K each. SuperSpool allows you to set aside memory (from 4K to 512K) as a print buffer; SuperSpool sends output to the printer in the background while you execute your program in the foreground. With SuperDrive and SuperSpool, you can significantly improve your PC's operating speed.

• **Proven Compatibility** — All AST Research hardware and software products are 100% compatible with all versions of the PC and PC-XT as well as the Compaq and other PC look-alikes, and are 100% compatible with PC-DOS 1.1 and 2.0.

• **Warranty** — All AST Research products are backed with a one year limited warranty covering parts and labor with an optional paid second year warranty available.

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LETTERS TO PC

I think you must address the issue of good taste. You have been taken to task in past "Letters To PC" columns for the cover of your August issue, and in the November issue you mention in your corrections that a cartoon in questionable taste has been eliminated. You also have ad copy in the same November issue that is pretty raunchy—do you really think that bikini-clad models in the ad copy enhance your publication?

Finally, I know your research indicates that 97 percent of your readership is male. Don't believe it. There are more women out here than you think.

Laurie K. Young
President
Business Software Centers
Lincoln, Massachusetts

I think you'll find our new format far more manageable. Both our advertisers and readers will benefit.

We, too, are concerned about taste in editorial content and advertisements. We could argue that there is just as much skin in the lingerie ads in your Sunday paper, but the real question is context. The bikini-clad model was there to stop page-turners, male and female alike. How you react once you stop turning pages may be secondary to the advertiser. We notify our advertisers when we receive negative feedback from their ads, but expressing your concerns directly is probably the most effective means of making your preferences felt.—Ed.

Down with Silver

Maybe it's because we all use CRTs and don't complain too much about how hard the phosphorus screen is on our collective eyes, but how is it that there is not an overwhelmingly negative response to the silvered pages of "PC-Communiqués"?

After the second silvered page, I have to stop reading the communiqués and go back to gleaning story copy from amongst the advertisements (this hardship I accept as a measure of your success).

Judith Mueli
Los Angeles, California

Your letter puzzled us. Not only are you the only reader to complain about the silver pages, but we polled the PC staff and discovered that no one found the silver paper hard on his or her eyes.

You're in luck, however, even if you are in the minority. As of Volume 3 Number 1, "PC-Communiqués" was absorbed by the new "PC News" section and no longer appears on silver paper.—Ed.

PC Medical Pen Pal

I am a physician in private practice and a PC owner. One of my interests is in the application of the computer to my work in anesthesiology. I am involved in the medical/educational aspects of the field, not the office management aspects. If there are other readers with similar interest, I'd like to hear from them at 1199 Summit Rd., Santa Barbara, CA 93108.

Michael Diamant
Santa Barbara, California

Canadian Customs

During a combined business trip and vacation, I packed my Compaq along with my luggage. I was able to accomplish a great deal of work, and I used the computer for recreation as well. It was most interesting to see that many hotels appeared used to the idea of setting up a computer in a guest's room. They were very accommodating. The same cannot be said, however, for the government of Canada.

On the trip back home, we decided to take a detour to see the Canadian side of Niagara Falls. Upon entering Canada, we were asked if we had anything with us other than our clothes. I told the customs agent that we had our computer, and he directed me to the customs facility, where I was told that to enter Canada I would have to pay a duty of 10 percent of the value of the computer. I was also told that I was obviously using the computer for business because "no one has ever traveled with a computer for fun in Canada," and that if we had not declared the computer, it would have been subject to seizure and we would have been subject to arrest.

All computer users should be aware of this: Have computer, will travel—but not to Canada.

Sheldon R. Gawiser
Westport, Connecticut

Likes Our Looks

Keep up the good work at *PC*. Aside from the excellent editorial content, it's almost the only computer magazine that looks as if the art director went beyond the draw-this-matchbook-cover school of design. The magazine's design really helps the communication of ideas.

Danielle Fagan
Austin, Texas

Our art director, Mitch Shostak, thanks you for your kind comments. We're not sure he'd want everyone to know, but he admitted to us recently that at age 9 he "drew the pirate" from a matchbook cover and submitted it, but got no response. If we'd known that he was rejected from the Matchbook School of Art, we might not have hired him (only kidding, Mitch).—Ed.

Correction

The letter "RPG II found" ("Letters To PC, *PC*, Volume 2 Number 6) incorrectly referred to the company manufacturing Baby/34 as California Products. The company's name is California Software Products, and it is located at 525 North Cabrillo Park Drive, #300, Santa Ana, CA 92701.

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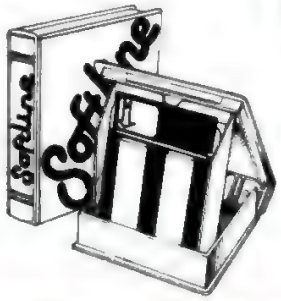

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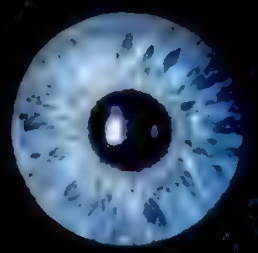

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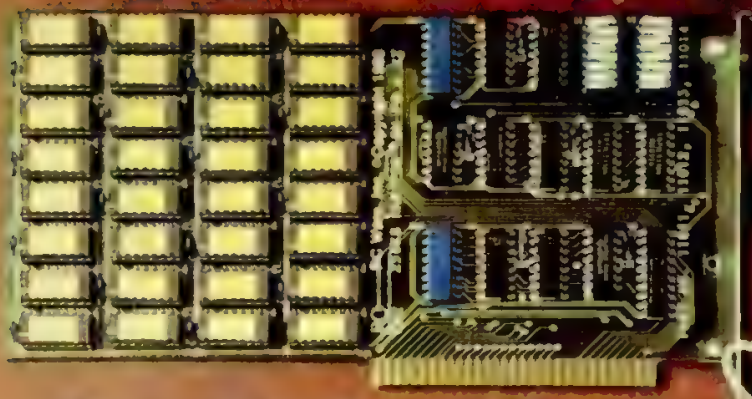

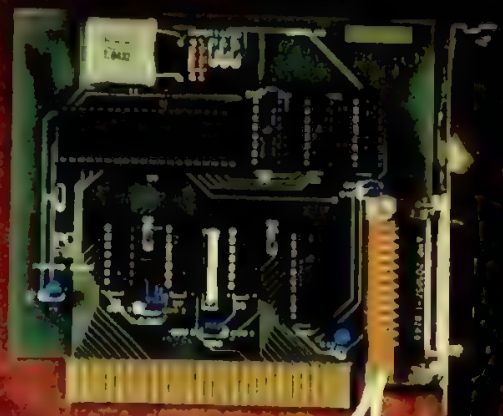

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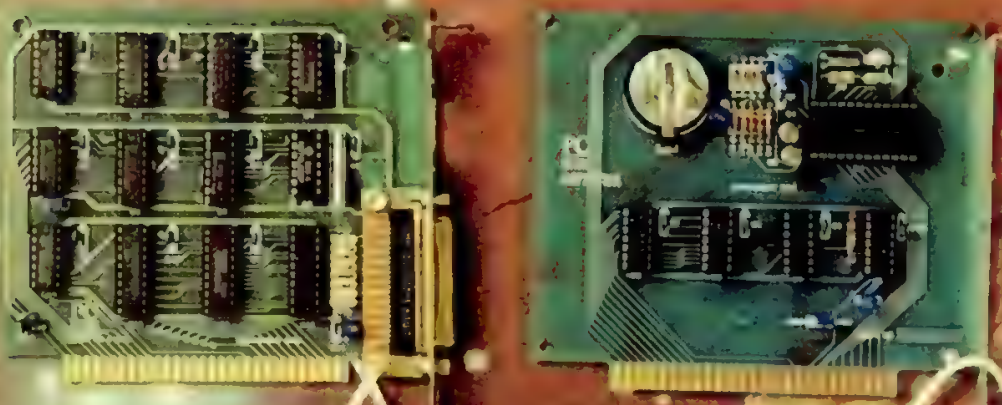

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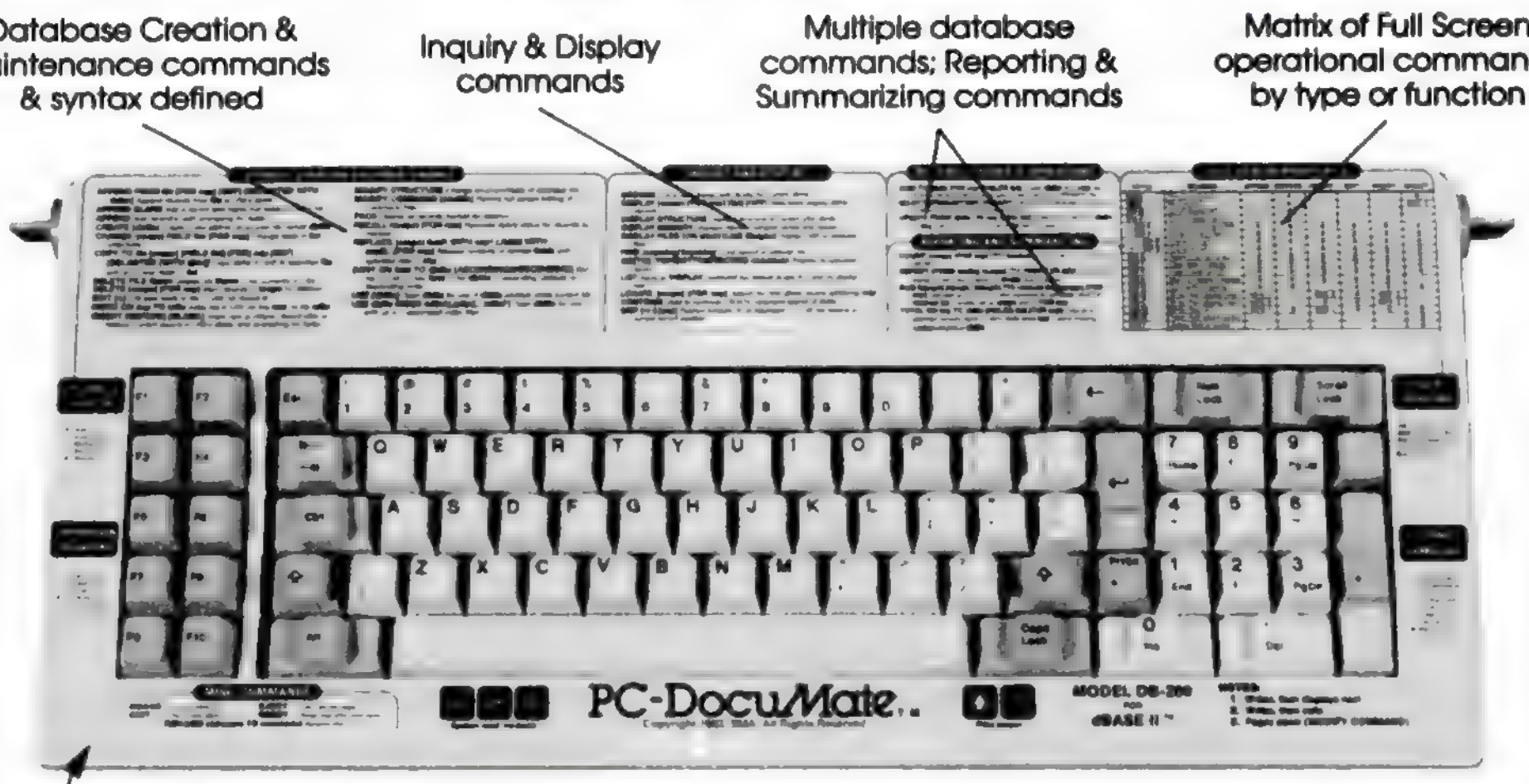

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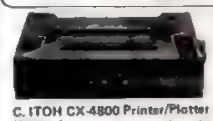

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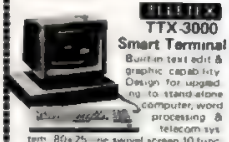

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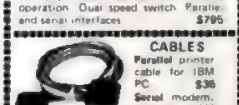

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Parallel printer cable for IBM PC — $35
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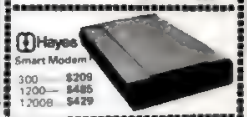

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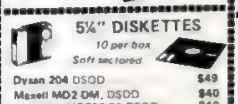
300 — $209
1200 — $485
1200B — $429



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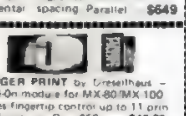

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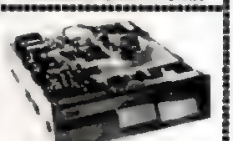

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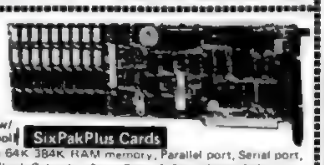

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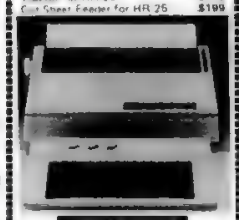
Tractor for HR-25 — $119

Cut Sheet Feeder for HR-25 — $199



DYNAX DX-15

New! Letter quality daisywheel printer with 2-color printing. Logic seeking, bi-directional proportional spacing, graphic & bold printing, direct printing, super/sub script, auto double strike & underline. 3 K buffer. Parallel — $CALL

Serial interface — $CALL

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Tractor — $119

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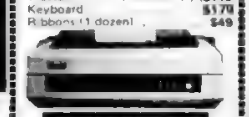


DAISYWRITER 2000

The intelligent letter-quality printer w/ 48K built-in buffer memory. 17 CPS, bi-directional, auto margin justification, universal interfaces — $1,059

Tractor — $119

COMREX CR-1

17 CPS daisywheel printer, bi-directional, Parallel — $CALL

FUJITSU SP-830

A super daisywheel printer w/ultra fast 80 CPS printing speed, plus many outstanding features — $2,095

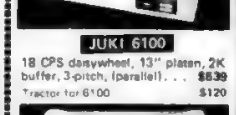
TOSHIBA P1350

Super dot-matrix printer w/24-pin hi-resolution head. 192 CPS draft, 100 CPS letter-quality parallel — $call

JUKI 6100

18 CPS daisywheel, 13" platen, 2K buffer, 3-pitch, (parallel) . . . $639

Tractor for 6100 — $120



C. ITOH F-10

40 CPS daisywheel (parallel) — $1,099

55 CPS daisywheel (parallel) — $1,349

Tractor for F-10 — $225

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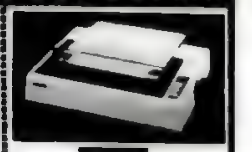
Letter quality daisywheel printer, 16 CPS, bi-directional, proportional spacing, super/sub script, underline, bold face. 65dB quiet operation. Parallel — $599

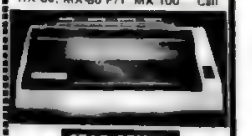


EPSON

FX-80, 160 CPS, 80 Col., friction & tractor feed, parallel — Call

FX-100, 160 CPS, 132 Col., friction & tractor feed, parallel — Call

RX-80, MX-80 F/T, MX-100 — Call



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Gemini-10X, 120 CPS, 80 Col., friction & tractor feed (parallel) — $Call

Gemini-15X, above w/15" platen — Call

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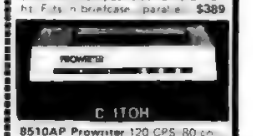

C. ITOH

8510AP Prowriter, 120 CPS, 80 col., graphics, (Parallel) — $Call

1550 Prowriter II, 120 CPS, 136 col., 2K buffer, graphics, (parallel) — $Call

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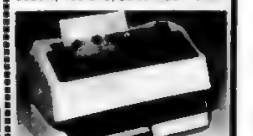
Tractor for NEC 3550 — $245

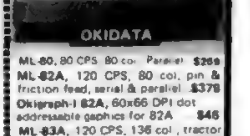
8023A, 100 CPS, 80 col., par. — $385



IDS PRISM

IDS Prism 80C, 200 CPS, 80 col., 4-color, graphics, friction/tractor feed, sheet feeder, (parallel) . . . $1,259

IDS Prism 132C, above but 132 col., Parallel — $1,495



OKIDATA

ML-80, 80 CPS, 80 col., Parallel — $299

ML-82A, 120 CPS, 80 col., pin & friction feed, serial & parallel — $379

Okigraph-I 82A, 60x66 DPI dot addressable graphics for 82A — $46

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Okigraph-I 83A, 60x66 DPI dot addressable graphics for 83A — $46

ML-84P, 200 CPS, 136 col., friction & tractor feed, (parallel) . . . $989

ML-84S, above but serial — $1,059

ML-92P, 160 CPS, 80 col., friction & tractor feed, (parallel) — $499

ML-92S, above but serial — $599

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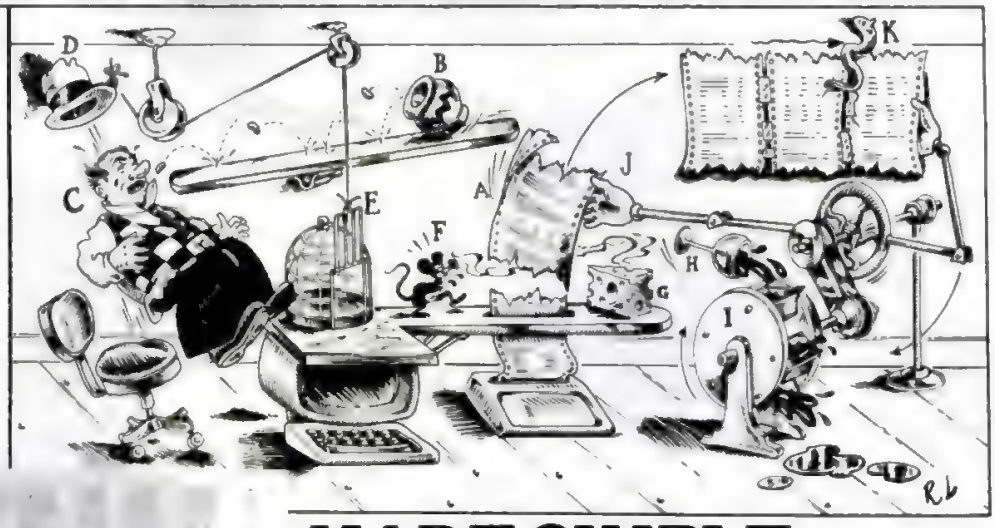
MOUSE, INSPIRED BY SCENT OF PERFECTLY AGED CAMEMBERT CHEESE, GNAWS THROUGH SPREADSHEET, ONLY TO DISCOVER HE HAS BEEN FOOLED BY AROMA OF OVER-RIPE GORGONZOLA (G).

IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA.

SHEET IS TAPED SECURELY IN PLACE BY TRAINED ADHESIVE TAPE WORM (K).



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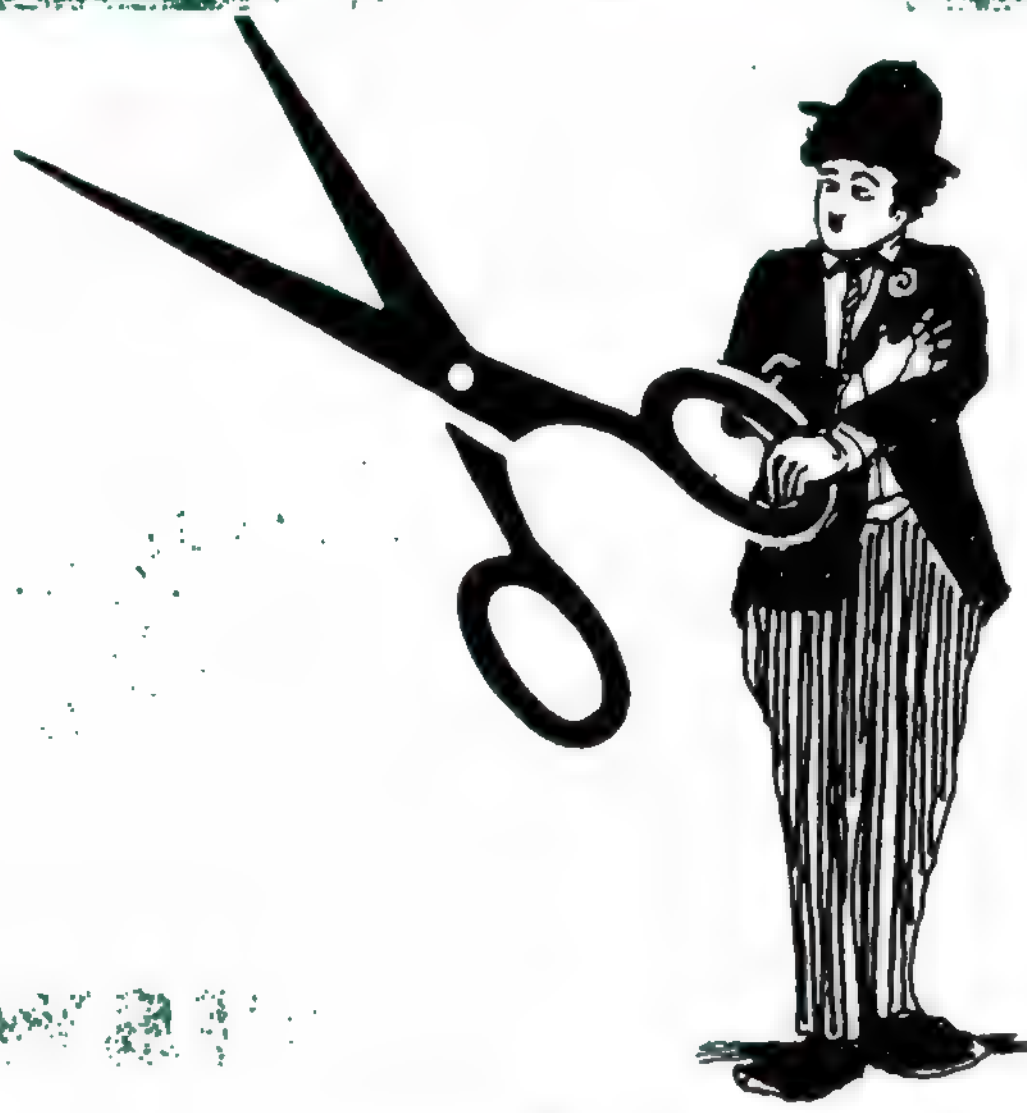

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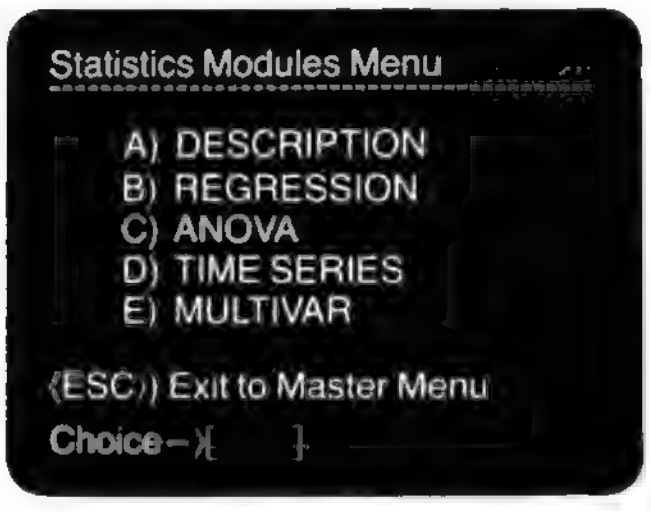

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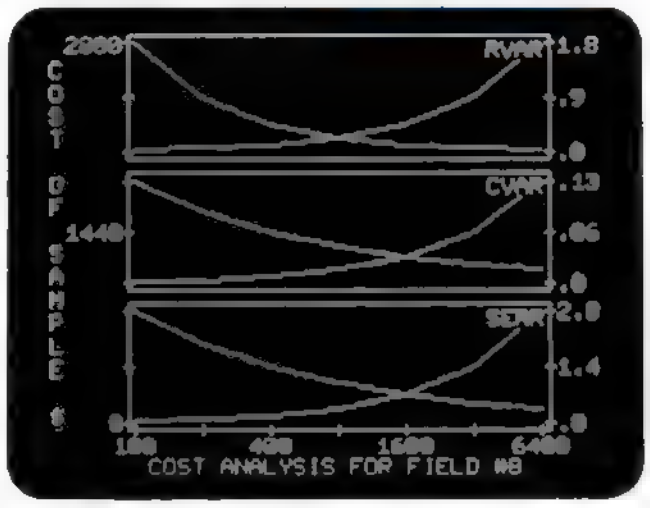

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CIRCLE 164 ON READER SERVICE CARD

Coming of Age Together

Advances in microprocessors have always forced personal computer manufacturers to play catch-up. And the game is just starting to get interesting.

In just over 2 years, the IBM PC has become the de facto industry standard for the 16-bit single-user personal computer. Even Apple acknowledges its dominance and now plans to introduce an MS-DOS upgrade for its own Lisa system. But the situation can't last; 16-bit systems will not remain the industry standard forever. The pace of development in the microprocessor industry has been tremendous for the last decade, and all indications are that it will continue unabated. New microprocessors will force the development of new computers to take advantage of them. In fact, the development of the personal computer industry can largely be traced to improvements in microprocessors. To understand why that's so, and what it means to the future of personal computers, we first have to consider the past.

Looking Back

The MITS Altair 8800 and IMSAI-8008 typified the first generation of personal computers. Introduced in 1975, they used front panels with switches and lights. Users manipulated the switches to load their programs. The first programs did nothing more than flash the lights on the front panel, à la Hollywood-movie computers. Early versions had 1K of memory. ROM was unheard of.

Soon memory size was increased to 4K or 8K. Programs were stored on paper or audio cassettes. The microprocessors of choice were the Intel 8080, Motorola 6800, and MOS Technology 6502. A typical system contained about 50,000 transistors and cost about $2,500. They were slow, difficult to use, and software was almost nonexistent. However, they were the training ground for the infant personal computer industry.

Sol Libes

The second generation, beginning in late 1978, included the Commodore PET, Apple, and TRS-80 computer systems. The overall capabilities of the systems were increased, making them easier to use. Memory size grew to 16K, 32K, and even 64K, while floppy disks allowed fast and easy access to 100K bytes or more of program and data storage. The total transistor count in a typical system rose to 300,000, with a typical system cost of about $3,000. Popular microprocessors included the Zilog Z80, MOS Technology 6502, Motorola 6809, and Intel 8085. All of these were still 8-bit microprocessors. Applications software such as word processors and spreadsheets appeared.

Where We Stand

The third and current generation of personal computers are modular and highly integrated. Many have hard-disk storage allowing users to have immediate access to 10 megabytes of program and data storage. Displays have become more sophisticated, placing greater emphasis on better user interfaces via color and high resolution graphics. New I/O devices such as the mouse, light pen, touch screen, and voice I/O are common, making the systems even easier to use. Graphics-oriented menus provide a more humanlike interface. Memory size is now often 256K bytes. System costs have risen to about $3,500. Performance has risen dramatically through the use of 16-bit microprocessors and math coprocessors. The Intel 8088 and 8086 microprocessors dominate the market, although some manufacturers (such as Apple) have chosen the Motorola 68000. The typical number of transistors in a modern personal computer (the IBM PC, for example) is 3 million.

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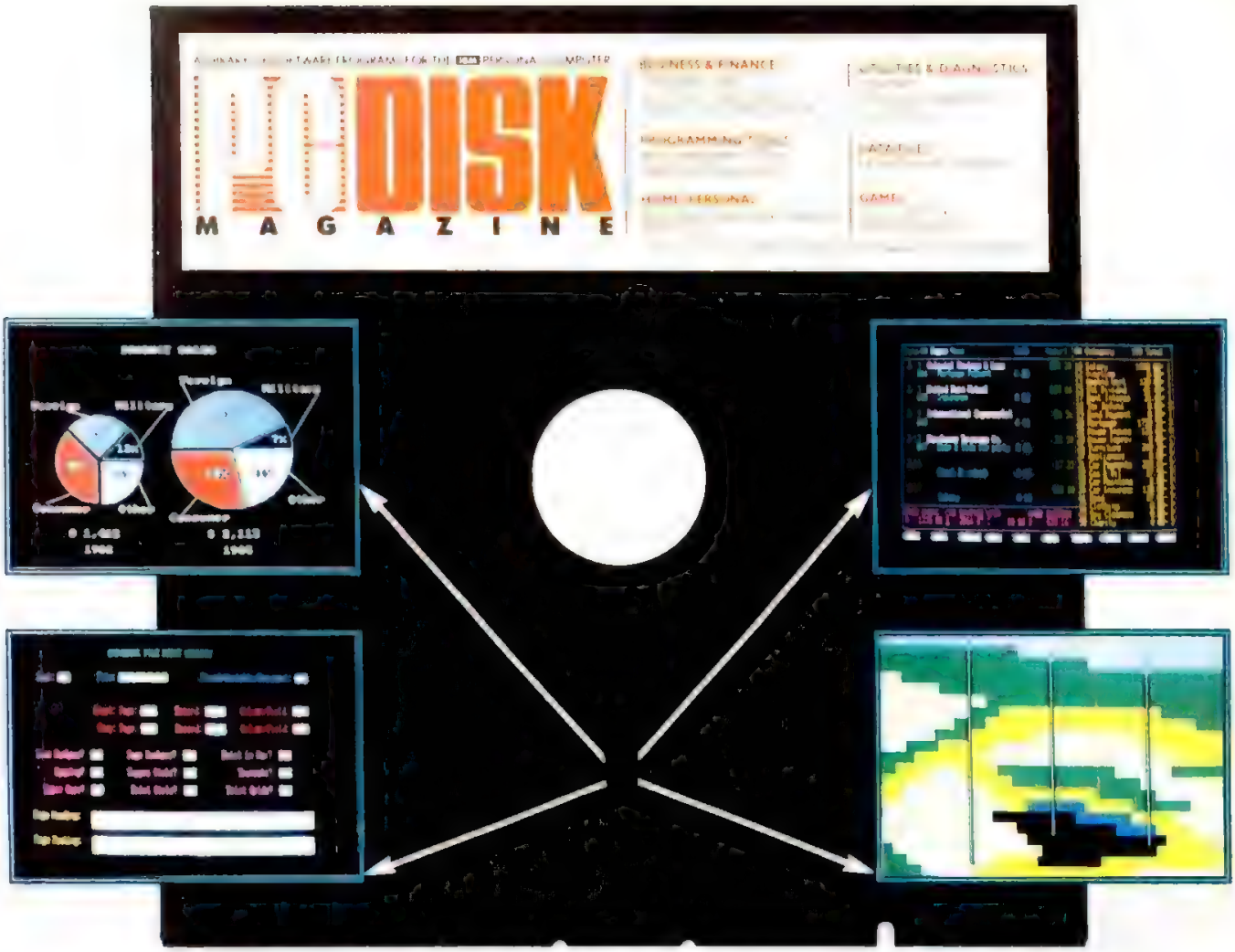

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EXPECT A MIRACLE

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Looking Ahead

We can expect personal computer manufacturers to utilize new technology based on the new Very Large Scale Integration (VLSI) microchips. This will enable manufacturers to produce more intelligent software and I/O devices, reduce system costs, and make products easier to use.

Since VLSI chips take 2 to 4 years to design and it takes more than a year to design the systems that use them, we should be able to see into the future by examining the VLSI chips now in development.

Let's take a look at what new VLSI products Intel is introducing now and what it has in the works. In 1982, Intel began sampling the 80186 and 80286, followed by the 80188 in early 1983. Very soon, Intel is expected to start sampling very low power, battery operable, CMOS versions of the 8086 (80C86) and 8088 (80C88) microprocessors.

All of the VLSI micros are software compatible with the 8088 now used in the IBM PC. The 80286 offers five to ten times the performance of the 8088, plus hardware memory protection for multiprocessing and multi-user applications. The 80186 and 80188 integrate 20 third-generation components onto one chip, reducing the size, power consumption, and cost of a system. The 80C88 and 80C86 will make possible a truly portable, rather than transportable, version of the PC. The 80286 is already in production, and production quantities of the 80186 and 80188 should be available by the first quarter of 1984. Sampling of the CMOS chips should begin in the first quarter of 1984, and production later in the year. As yet, no one has introduced a personal computer using the 80286, but one is inevitable. We can expect to see more powerful PC-compatibles becoming available during 1984, with the true portables arriving in early 1985.

The first version of the IBM PC utilized 4K-bit RAM chips. These chips grew to 16K in the second generation and 64K in the current generation. Manufacturers are now sampling 256K RAM chips and the personal computers now under development will use them. As a result, applications programs are expected to grow in features, power, and size.

It is expected that future generations of personal computers will make greater use of coprocessors to provide faster processing and greater power. For example, the PC contains a socket for the 8087 math coprocessor that recently became available from Intel in production quantities. The 8087 works in parallel with the 8088 in the PC which significantly speeds up processing of floating-point arithmetic and transcendental mathematics. The 8087 was sampled in late 1981 and production quantities became available in mid-1983.

> The typical number of transistors in a modern personal computer is 3 million.

Coprocessors for text and graphics processing and local area networking are now being sampled. Coprocessors for several other areas (for instance, database management) are also expected. Intel has already started production of the 8089 I/O coprocessor. New versions, one operating at a faster speed and another that works with the 80286, are in development.

The introduction of text and graphics coprocessors are expected to improve word processing and graphics on both displays and printers. The use of coprocessors should make true multiprocessing microcomputers a reality. Multiprocessing will allow a local area networking communications program to run in the background, even as a word processing application runs in the foreground and a file is spooled to the printer.

The 8087 coprocessor currently operates at approximately 5Mhz, slowing down the microprocessors used with it. It is expected that a high-speed version of the 8087 will become available in late 1984, allowing systems such as the IBM PC to run at full speed.

It is also known that Intel is doing development work in speech recognition with the intent of being able to recognize hundreds and even thousands of words. This goal is certainly within the realm of possibility for the powerful systems using the 80286 and 80386 microprocessors.

Intel already offers 8-bit CP/M on a chip and the manufacturer is working with Microsoft to introduce MS-DOS on a chip. Discussions have been held with Digital Research regarding putting concurrent CP/M on a chip. These products are not expected to reach the sampling stage until later in 1984, or early in 1985.

Further, Intel is in the early stages of developing what they call "high integration products" that will contain over 400,000 transistors on a single chip. It is expected that this technology will be applied to high-volume products such as complete personal computers on a chip. There is no doubt that, eventually, the power of a PC will be available on a single chip.

This means that within just 2 to 3 years we will be carrying personal computers with the power of the PC and possibly the XT in our briefcases. Sitting on our desks will be small "workstations" with the power of a VAX, communicating with other systems in the network and communicating with other networks in a galaxy of interconnected networks. As long as microprocessors keep getting better, personal computers will too. ■

Sol Libes is the editor of Microsystems *magazine and the author of 15 books, including* Interfacing to S-100/IEEE-696 Microcomputers, Digital Logic Circuits, *and* Small Computer Systems Handbook. *He is also a professor of electronic technology at Union County College in New Jersey.*

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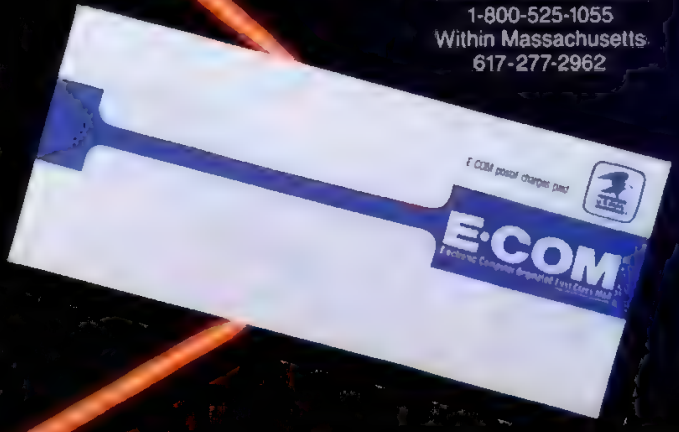

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Subdirectories In DOS 2.0

IBM claims that a program running under DOS 2.0 can treat a subdirectory as a file. Norton discovers this isn't true and explores the obstacles.

In last month's column we took an overall look at file attributes, which are part of the mechanism that DOS uses to control and manage disk storage space. You'll recall that we mentioned that each entry in a disk's directory has an attribute byte, and the 8 bits of the byte are used to set some of the characteristics of the directory entry (for example, to mark a disk's volume ID label or to make a file hidden). One of the bits is used to control subdirectories on a diskette, which is the subject of this column. We'll cover some general information about subdirectories and wander into one of the most interesting uncharted areas of using disks.

Peter Norton

Fixed-Size Directories

Each diskette or hard disk that DOS uses has a directory of the files (and other items), which are stored on the disk. Before DOS 2.0, each diskette had a fixed-sized directory, which could hold a maximum of 64 files for single-sided diskettes and 112 for double-sided diskettes. The 10-megabyte IBM fixed disk has 512 directory entry spaces. This fixed-size directory cannot be expanded, but with DOS 2.0, we can create subdirectories that make it possible to keep more files on a disk.

The standard, fixed-size directory, called the root directory, is the starting point for finding anything that is stored on the disk. In a disk's root directory we can keep a record of our files and place subdirectories in the root directory. In each subdirectory we can place other subdirectories. Each directory can have other directories stemming from it. This scheme is called a tree structure, because subdirectories fan out from other subdirectories, which fan out from the directories, like branches on a tree. The structure can be as complicated as we want to make it. DOS must have a way of identifying which entries in any directory are the names of ordinary files and which are the names of subdirectories, which is what the file attribute byte is used for. Subdirectories are identified by an attribute byte with bit 4 set, which gives the byte a hexadecimal value of 10 or a decimal value of 16. When bit 4 is set, DOS knows that the directory entry is for a subdirectory, not for a file or a volume ID label.

Subdirectories are curious things and working with them creates some special problems for DOS. Before DOS 2.0, diskettes had old-fashioned root directories, which are relatively easy to work with because they have a specific location reserved for them on the disk. Their fixed size also makes them easy to use. Subdirectories can be created at any time, so DOS must have a way to find space for them. The neat and obvious solution is to store subdirectories in a disk's available working space, just as a file would be stored.

It is Like a File, but. . .

So, in many ways a subdirectory is like a file. A subdirectory has a name, just as a file has a name, and that name is stored in a directory. A subdirectory is stored in a disk's data space, just as the contents of a file are stored on the disk. Space is allocated to subdirectories in exactly the same way it is allocated to any file. When we

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create a subdirectory, DOS allocates one cluster of space for the subdirectory, just as it would for a small file. The size of a cluster varies with the type of disk, and so the initial size of a subdirectory varies. On a single-sided diskette, a cluster consists of one 512-byte sector, which can hold 16 directory entries. On a double-sided diskette, a cluster is two sectors and can hold 32 directory entries. On the IBM fixed disk, a cluster is eight sectors and can hold 128 directory entries.

DOS allows files to grow in size by allocating more disk space to them when they need it. Since subdirectories are stored the same way files are, they are allowed to grow, too. While the number of entries a disk's root directory can accommodate is fixed, subdirectories can grow to any size. There is no limit to the number of files that they can hold. This in itself is one of the chief advantages of using subdirectories. If you keep all your working files in a subdirectory, you never have to worry about running out of directory space. Since a subdirectory is stored the same way a file is stored, it's not unreasonable to expect a program to treat it as a file, reading or writing the information in the directory. The DOS manual says this can be done, but people who have tried it have not succeeded. Exploring the reason why may give us some insight into how DOS files work.

The Obstacle Course

As far as I can determine, there are two obstacles that prevent programs from treating subdirectories as files. The first is the attribute byte, which brings us back to the point I began this discussion with. When a program works with files, it expects to find that they have the ordinary file attributes byte value of zero. Unless we perform a few tricks, a program cannot read or write files without the attribute set to zero. However, when we study the discussion of how DOS gives our programs access to files, we discover that DOS will allow us to work with files with special attributes, provided we indicate which attribute of the file we want to use. Using this method, programs are able to read or write hidden files. Telling DOS to use a special attribute—such as the hidden subdirectory attribute—requires a little programming magic, but with some fiddling it can be done. So, this obstacle to using subdirectories can be overcome.

The second obstacle has to do with the way DOS stores information about a file size. One of the pieces of information about each file that is kept in its directory entry is the file size in bytes. This is the same file size that we see when we use the DIR command. DOS uses this information for several purposes, one of which is to know where the file's data ends. When a program reads data from a file, DOS reports when the end of the file has been reached by using the information about the file's size, as recorded in the file's directory entry.

> Telling DOS to use a special attribute requires a little programming magic.

This causes a special problem when we try to read a subdirectory as if it were an ordinary file. When DOS builds a subdirectory, it indirectly knows how big that subdirectory is according to how much space it has been given. But—and here's the kicker—DOS doesn't store this information in the size part of the subdirectory's own directory entry. Instead, the size of the subdirectory is given as zero. So when a program tries to read a subdirectory as a file, DOS finds that its size is zero, meaning that there is nothing in it. The program trying to read the file is told something like this: "Sorry, folks, nothing here to see."

As I mentioned, it is relatively easy for a sophisticated program to overcome the first obstacle to reading a subdirectory like a file; it can be done by setting the right file attribute when asking DOS to work with the file. But, as far a I know, there isn't any reasonable way to overcome the second obstacle.

On the other hand, it should somehow be possible for our programs to create a subdirectory and the information in it by asking DOS to let us write a file that has the special file attribute for subdirectories. I am speculating that a program could create a subdirectory file at proper length so that a program could also later read it as data. If any of you readers know more about how to successfully read subdirectories or have any tidbits of information on the subject that might be helpful, write to me, care of *PC* magazine, and I'll pass them along to other readers.

Understanding Our Computers

All of the business that we've been discussing in this column—the tricks and problems of trying to treat a subdirectory as a file—is arcane, and few of us will ever have any opportunity or desire to experiment with it. Nonetheless it is fascinating to think about, because it deepens our understanding of what is going on with our computers. Another thing it has revealed to us is that the DOS manual is incorrect on this matter: It tells us that subdirectories can be read as data, but apparently this is not true.

This points out the difficulties inherent to anything as complex as DOS. The design of DOS seems to allow us to work with subdirectories like files but the way certain tasks are handled prevents us from doing so. No matter how skillful we are as programmers, this sort of thing is bound to happen. When we create rich and complex programs such as DOS, they inevitably have some little flaws.

And inspecting these flaws is more educational and interesting that simply admiring a program's shiny new paint. There is much more to learn about subdirectories than the little bit we've covered here and, when time permits, we'll go into other aspects of this very important part of DOS 2.0. ■

COVER STORY — ERIK A. HART

The ABCs Of dBASE II

Beloved by novices and experts alike, Ashton-Tate's wunderkind is the most popular database management program on the market. Here's how dBASE II works.

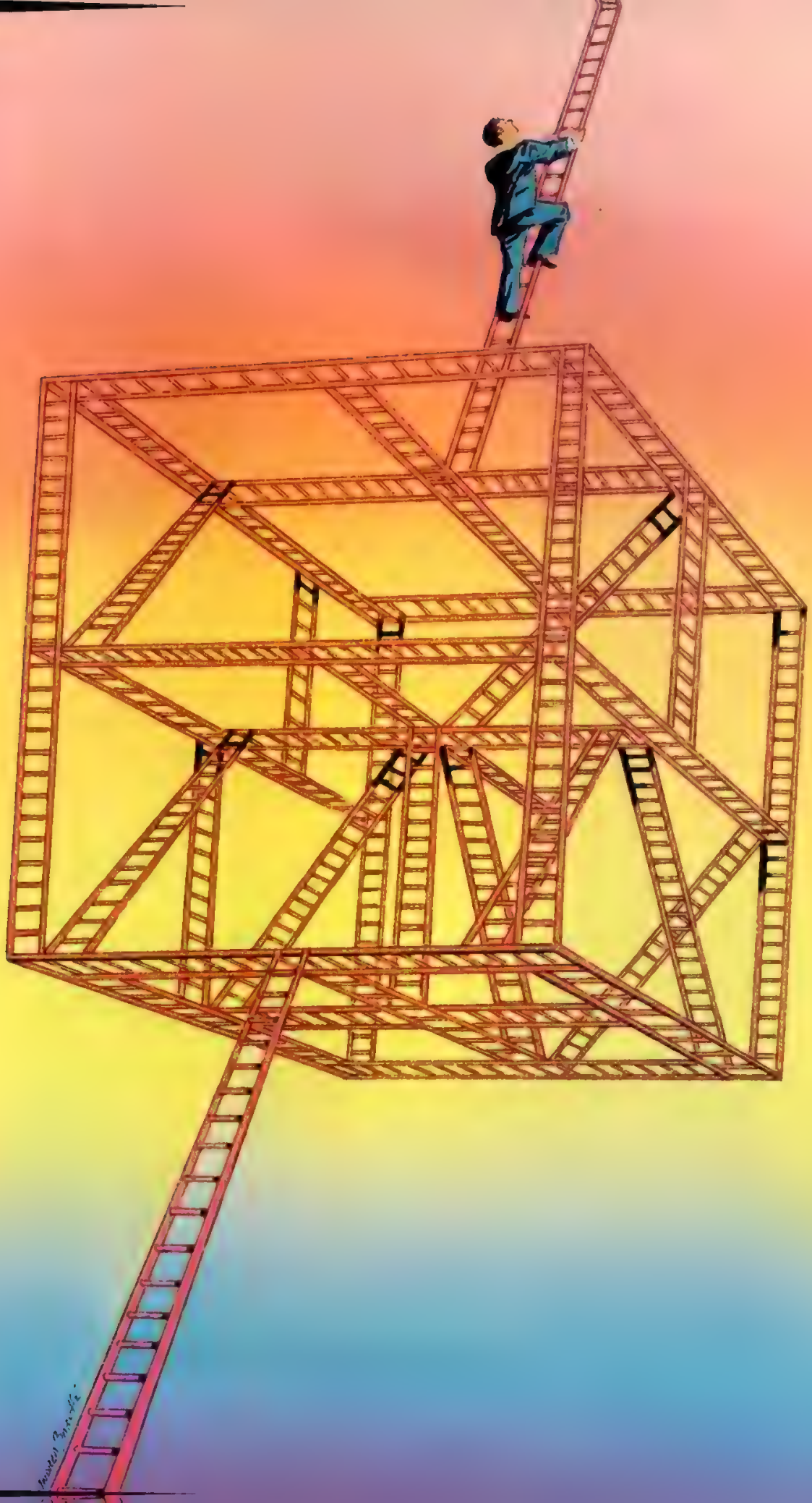
The words *dominance*, *leadership*, and *market share* are all terms near and dear to marketers of any product. While there are clear leaders in various software categories, no single product dominates its category as clearly as dBASE II, the relational database manager from Ashton-Tate.

Independent industry watchers estimate that *dBASE II* enjoys 70 percent of the market for microcomputer database managers. Obviously, all the other micro database managers are left with table scraps. Such a market share would be the envy of Proctor & Gamble or General Motors.

Is *dBASE II* so superior to its competition? Was its early introduction a major factor? Does it do things other programs can't do? Is it cheaper? Is its documentation better? Is it easier to learn or to use? Is it faster or more efficient? Is it easier to sell or demonstrate? Has it been marketed better?

The answers to all these questions is a resounding yes—and no. Although *dBASE II* is an excellent program that meets the needs of an unusually wide

Illustration: Andrea Baruffi



spectrum of users, it has its share of warts and blemishes, too.

Marketing Strategy

Since its introduction, *dBASE II* has been sold with a 30-day money back guarantee. This was a unique concept when Ashton-Tate first instituted it, although others have copied the idea since. A virgin *dBASE II* package includes a demo disk with various built-in limitations and a sealed, fully functional disk. You can return the product within 30 days as long as the sealed disk is unopened. Ths clever marketing strategy allows you to examine a product retailing at $700 without taking the full financial risk.

The process of getting *dBASE II* running is simple, especially on an IBM PC or compatible machine. One of the major advantages of the PC environment is the standardization of video attributes; the PC version is pre-installed in this respect. The program requires you answer only two questions: The first asks which macro character is to be used and the second asks whether you want full-screen operations. A beginner won't have the vaguest idea what this means, and the onscreen messages and documentation don't help, either. However, hitting the Return key is almost always the right answer.

Invoking the program is as easy as typing the letters D-B-A-S-E. After *dBASE II* signs on, a period appears at the left margin, and everything grinds to a halt. This is *dBASE II's* prompt character and it indicates that the program is waiting for a command. No menu is shown. The newest *dBASE II* version does include a Help facility that provides brief summaries of available commands, but a rank beginner wouldn't even know that it exists.

The naked period staring at you has been a matter of controversy over the years. Competitors assert that *dBASE II* really can't do anything unless you either learn the commands or use a program written by someone else. Some feel that other menu-driven, handholding programs are more friendly to beginners. Others believe that menus are fine for a while, but they slow down the more experienced user.

Put simply, the purpose of a database manager is to store information in a structured manner and to allow easy retrieval of the information. The various data management schemes all ultimately serve this basic function. Entire texts have been written on the pros and cons of the various methods.

dBASE II uses a scheme known as relational data management. This is the easiest system to understand and designing and accessing the database requires little sophistication. Although more complex methods have certain advantages in given situations, relational databases have become a hot topic on mainframe and minicomputers in the last few years. *dBASE II* was the first such system for microcomputers, a fact that certainly helped establish it as the leader.

Defining the Database

The first step in using *dBASE II* is to define the database, which will store the information. In a relational database, there are two primary concepts: the record and the field. A field is simply one piece of information, such as "last name" or "balance due." A collection of such fields pertaining to one individual, company, or product is called a record. An easy way to understand this is to visualize a Rolodex file. Each card holds information on a company, including its name, street address, city, state, zip code, and telephone number. These are the fields. Since there is one card for each company, each card is comparable to a *dBASE II* record. One difference is that each Rolodex card could contain some information category not found on every other card. In a relational database, every record must have exactly the same number of fields, even if not every field in every record contains data.

Accordingly, you should give careful thought to what fields you want to designate. Like some other database managers, *dBASE II* allows you to add or delete fields after the database has been designed, but only by going through some convoluted steps. Therefore, it makes sense to think through the data design before entering data.

It might help to think of the data as arranged in a table with the records as rows and the fields as columns. This simple tabular structure is one of the main attractions of the relational model.

dBASE II uses commands to carry out its operations. Most commands closely resemble verbs and, like verbs, can be modified with clauses that narrow down the scope of the verb's actions or to further specify the action desired. The first command to learn is CREATE, which you will use to design the database.

When you type the command CREATE, *dBASE II* asks what you want to name the database. The normal eight character limitation applies, and no file type should be used since *dBASE II* automatically uses the ending .DBF for data files. Each field is given a name of up to ten characters. Then *dBASE II* asks what type of information will be stored in the field. *dBASE II* accepts three types of data: character, numeric, and logical. For numeric fields, the number of decimal places desired can be specified. Logical fields store either T for true or F for false and are most often used as "flags" to indicate the status of a situation. *dBASE II* allows up to 32 fields of up to 254 characters each, with a total limitation of 1,000 characters per

record. This is plenty of room for normal applications, especially for a beginner, but it is sometimes insufficient for more serious work.

You enter the name, type, and width for each field. When you are finished, *dBASE II* immediately asks if you want to enter data. The creation process is extremely easy; it probably takes longer to read about than it would have taken to actually do.

Data Entry

Entering is a simple process, too. *dBASE II* displays an entry screen with the name of each field on the left margin, followed by the defined field length, which is surrounded by colons. You can use control characters to move the cursor around and make corrections until the final field is entered and the record is stored. The control character sequences are similar to those used in *WordStar*, so, if you are familiar with that popular word processor, you'll feel right at home.

If you prefer to enter data at a later time, you type the USE command followed by the file name to specify which data file you want to work with. You then use the APPEND command to instruct the system to add records.

The EDIT command is used to revise a previously entered record. You need to know the number for the specific record that needs modification, because the program asks you for it. The DISPLAY and LIST commands both display each of the records in the database on the screen, including the record number that *dBASE II* assigned to each record sequentially as the data was entered. Alternatively, the BROWSE command can be used to display an entire screenful of records, one to a line, with as many fields across as will fit on the screen. Control characters are used to display more fields by "panning" left or right. This command can be easier to use than the EDIT command if many records need changing. If the fields are a reasonable length, the first fields will scroll off the screen when you pan to the right to see additional fields.

All these commands can be modified and extended with additional clauses. One of the most common is FOR, which is used to restrict the scope of a verb to records meeting certain criteria. For example, the command

```
LIST FOR ZIP < '10000'
```

would list only records with New England zip codes (assuming, of course, that a zip code field named ZIP existed). Normal relational operators such as less than, greater than, and equal to can be used to define the criteria. A special *dBASE II* relational operator is $, the substring operator. A relation such as

```
'H'$name
```

would be true for any record in which a capital H was contained in the name field. The *dBASE II* commands .AND., .OR., and .NOT. can be used to build more complicated selection criteria, for instance,

```
DISPLAY FOR AMOUNT > 0 .AND.
STATE = 'NY'
```

The NEXT modifier can indicate how many records to process (LIST NEXT 10). FIELDS narrows down the fields which are displayed (BROWSE FIELDS name, phone). Modifiers can be combined, like this:

```
LIST NEXT 20 FIELDS company,
contact, balance FOR balance
> 0.
```

> dBASE II does not immediately erase a deleted record. To remove deleted records, you use the PACK command, which rewrites the entire data file.

To move within the database, you use such commands as GOTO record number, GOTO TOP, and GOTO BOTTOM to move to the first or last record in a file. The SKIP command passes over a number of records in either direction. APPEND and INSERT add more records to an existing database. The modifier BEFORE indicates where to add records, and BLANK can be used to add an empty record that can be filled later.

Packing It In

A record can be deleted with the DELETE command, which can be modified to weed out specific records. (DELETE NEXT 10 or DELETE FOR state = 'CA'). *dBASE II* does not immediately erase a deleted record; it just marks the record as deleted. The RECALL command can reverse this status and make the record active again. To actually remove deleted records, you use the PACK command, which rewrites the entire data file, compressing it as it goes along by removing the records previously marked for deletion. Once you've done this, the deleted records really are gone forever.

At any time, you can display a record or other information with the question mark (?) command. Typing ? ZIP will display the zip code for the current record. The question mark also lets you use *dBASE II* as a simple desk calculator; *dBASE II* will display the answer 2 when you type ? 6−4.

These commands establish a very comfortable, interactive environment. Creating a database, entering information, editing it, and seeing what's stored are all straightforward and almost intuitive once you learn the commands. In many ways, this level of *dBASE II* activity feels like programming with a BASIC interpreter; the program's immediate response lets you feel connected to the machine. Using the commands also makes for an impressive demonstration on the sales floor. Prospective customers are won over as they enter data and ask the machine questions after only a few minutes of playing with

the program. It's also easy for an adept salesman to tailor the data structure to a customer's specific requirements to make it clear that the computer could help that customer with his business.

All these features help account for some of *dBASE II's* success on the retail floor, but more complex work requires more sophisticated commands. *dBASE II* has a plethora of them.

It's easy for an adept salesman to tailor the data structure to a customer's specific requirements.

You can copy the entire database or a portion of it to another file with the COPY command. COPY can do a lot of useful work with such statements as

```
COPY FIELDS name, balance TO
newfile FOR balance <> 0.
```

The very structure of a data file can be copied to another file for advanced manipulation. You can copy data to a new file in various formats compatible with BASIC, *WordStar* and other programs in order to use *dBASE II* files with other software. The APPEND command can read such "foreign" files, too, and can enter data prepared with other programs into an appropriately structured *dBASE II* file.

You can change the information in any or all records in several ways. The CHANGE command allows editing of a group of files that meet a selection criterion. The more powerful REPLACE can change the contents of one or more fields in many records at once. For example, if vendor number 123 increases his prices 10 percent, the command

```
REPLACE FIELD price WITH
price * 1.1 FOR vendor =
'123'
```

The dBASE II—BASIC Connection

If you're struggling to master dBASE II, knowing good old BASIC may help you out.

If you already know BASIC, you will be pleased to learn that *dBASE II* is very similar to BASIC in a few important ways. Like BASIC, *dBASE II* operates in both an interactive, interpretive mode wherein commands are immediately executed and in a batch mode wherein lists of commands can be stored and executed. Arithmetic and string operations are similar in both languages, although in BASIC there are more operations available to the programmer. Control of program flow through loops and conditional branches is similar in both languages.

Because *dBASE II* is designed for a specific purpose, there are major distinctions between it and BASIC. I have isolated the following differences:

- *dBASE II* is oriented toward reading, writing, and manipulating information in database files, while BASIC is a general purpose programming language.
- *dBASE II* does not provide for dimensioned arrays.
- *dBASE II* statements are not numbered and you cannot branch to them with a GOTO or GOSUB statement as in BASIC.
- *dBASE II* distinguishes between variables contained in records and variables contained in memory. You need to use different commands to perform the same operation on the two types of variables.
- *dBASE II*'s syntax is much more rigid than BASIC's.
- *dBASE II* generates several types of files, and different commands are used to operate on the different file types.
- With a few minor exceptions, *dBASE II* cannot be used with graphics, music or sound, cassette files, communications, light pens, or joysticks.

Beyond these major differences, here's how the two languages stack up against each other.

Organizing and Using Files

BASIC has two types of disk files, sequential and random access. Both types must be explicitly opened and closed. When using random access files, each field in the record must be predefined as to size and each variable is considered a character string.

In *dBASE II* there are six different disk file types: database, report form, command, index, memory, and text. Database files are randomly accessed files. Each field of the record must be defined by size and data type (character, numeric, or logical). Index files contain indices for database files to permit rapid location of data in the database. Report form, command, memory, and text files are all sequential files. Report form files contain formats for reports. Command files are lists of *dBASE II* commands.

dBASE II's syntax is more rigid than BASIC's

Memory files allow you to save miscellaneous pieces of information that are not strictly part of the database. Text files are the result of directing output intended for a printer to a disk file.

Here are some of the specific file-related differences and similarities:

- In BASIC, you display the directory of files with the FILES command, and in *dBASE II* with the DISPLAY FILES command. While FILES will display all files, DISPLAY FILES defaults to database files only.

• In both languages, files may be renamed. The RENAME command is used in *dBASE II* and the NAME command in BASIC.

• A list of BASIC commands can be saved to a file with the SAVE command. In *dBASE II*, you must first establish the file in which you wish to store the commands through a MODIFY COMMAND filename statement, and then edit this file.

• A file of *dBASE II* commands is executed by the DO filename command. While this is usually accomplished with a RUN command in BASIC, the *dBASE II* DO is probably more like the BASIC MERGE command.

In the same way as BASIC, *dBASE II* uses the INPUT command to receive and store data items entered from the keyboard. *dBASE II* also has an ACCEPT command that is similar to BASIC's LINE INPUT comand for entering a character string from the keyboard. Aside from this, the two languages handle input and output rather differently:

• The latest version of *dBASE II*, 2.4, makes use of the programmable function keys. In BASIC, function keys can be set by KEY n,x$, where "n" is the key number and x$ is the character string to be entered when key n is pressed. The same function in *dBASE II* is accomplished with the SET Fn TO x$ command.

• BASIC does not have the EDIT and BROWSE commands that *dBASE II* has for editing records.

• *dBASE II* does not have analogous commands to BASIC's ON KEY, KEY ON, KEY LIST, SCREEN(row, col, z), and INKEY commands.

• *dBASE II* has powerful commands to

(continued)

would make the correction in all records for products supplied by this vendor.

To change the structure of a file itself, you can use the MODIFY STRUCTURE command. This command is somewhat tricky, because it erases all data from a

database. To get around this, the sequence

```
COPY TO temp, MODIFY
STRUCTURE, APPEND FROM temp
```

copies the existing data to a temporary file, modifies the strucutre, erases the data, and reloads the copied data from the temporary file.

Assorted Problems

The data is initially stored in your database in the order in which you enter it. This may not be the order in which the information is needed, and *dBASE II* provides two mechanisms to rearrange data into any desired order. The SORT command actually sorts and rearranges the data on disk. The command

```
SORT ON zip TO ziporder
```

would create a new database file called ZIPORDER.DBF, with all the records in the original file sorted in ascending zip code sequence. The modifier DESCENDING is available for sorting in the reverse order. Sorting to a separate file is far safer than sorting the data file itself. If something goes wrong during the sort, the original unchanged file is still available.

There are two major problems with SORT. First, it is terribly slow, and second, it only sorts on one field at a time. If you want to sort by zip code and sort names alphabetically within the zip code, you must do two slow, slow sorts. The *dBASE II* sort is so slow that it is far faster to convert the file to an alien text file, use a commercial high-speed sort program like MicroPro's *SuperSort*, and then read it back into *dBASE II* form. While *dBASE II* sorts are faster on a RAM disk or hard disk, since the sort is disk based and thus can sort files larger than will fit in memory at once, it's the basic algorithm that's the problem. Sorting is therefore slow even with faster storage devices.

Fortunately, there's a better way (unless the file must be physically sorted for some reason). *dBASE II's* INDEX command implements an indexing mechanism that is both faster and more flexible than actual sorting. Indexing involves creating a separate file containing "pointers" to the record numbers in the data file itself. If you sort these pointers, they can direct your inquiry to the appropriate record number in any desired sorted order without the need to sort the data file itself. For example,

```
INDEX ON zip TO ziporder
```

would create a file named ZIPORDER.NDX. The command

```
USE customer INDEX ziporder
```

opens the data file named CUSTOMER indexed by the index file ZIPORDER. The LIST command will display the records in the sorted order you established when you generated the index file. *dBASE II* allows seven index files to be associated with a database file, so you can maintain several distinct sorted orders without ever actually sorting the main file. The "key," the basis for the index, can be a complicated expression using more than just one field name; this scheme allows you to design rather complex indexing schemes.

(continued)

Command Performance

Two commands locate records containing specific information. FIND looks for key values if, and only if, the appropriate index has been created. In the example

above, the statement FIND '10952' would find the first record that had a zip code of 10952. FIND always positions to the first matching record; other techniques must be used to find a subsequent matching record. The main benefit of FIND is speed; the matching record can be found in a couple of seconds even in extremely large data files.

If a file hasn't been indexed on a field you would like to search, you can use the LOCATE command. It will search through a database until a match is found in any field, although this is much slower than using the FIND command. The CONTINUE statement locates the next matching record.

Other commands indicate how many records meet specified conditions. The command

```
COUNT FOR zip < '10000'
```

reports how many New England addresses are in the database. SUM adds numeric amounts in a group of records. TOTAL totals up keyed fields to a separate database for analysis.

While listing or displaying data can answer an *ad hoc* question posed at the terminal, most users want printed reports

(BASIC Connection continued)

display portions or all of a database on the screen. The DISPLAY, EDIT, BROWSE, REPORT, and LIST commands allow you to display part or all of selected records in the database one at a time or in total. EDIT and BROWSE let you display as well as edit this information. BASIC is restricted to commands like PRINT and WRITE, which are much more limited.

- For outputting data items to specific locations on the screen or printed page, *dBASE II* uses the @ SAY (or GET) command. In BASIC, two commands, LOCATE and PRINT, are required to do the same thing.

Command Performance

While the two languages have control commands that perform essentially the same functions, the names of the commands are often different:

- To set up a "FOR/NEXT loop" in BASIC, you use the FOR and NEXT statements. The FOR statement contains a counter to determine the number of times the loop will be executed. In BASIC, the WHILE and WEND statements are used to define a loop.
- In *dBASE II*, the DO WHILE and ENDDO statements are the same as the BASIC WHILE and WEND. There is no loop command with a built-in counter like the BASIC FOR. There are, however, the DO CASE and ENDCASE statements which can be used to streamline loop logic.
- Both languages have conditional branches. *dBASE II* has IF, ELSE, and ENDIF statements; BASIC has the IF, THEN, and ELSE statements.
- *dBASE II* does not allow you to program error trapping routines, which are possible in BASIC using the ON ERROR statement.
- In BASIC, you use the SYSTEM command to return to DOS. The equivalent command in *dBASE II* is QUIT. A *dBASE II* user should always use QUIT to end a session to avoid damage to files that may be left open.
- A *dBASE II* CANCEL is equivalent to a BASIC STOP. Both terminate execution of a list of commands and return to the command level of the language. Neither of them close the files.

Those familiar with BASIC will have little trouble mastering *dBASE II*'s string and data operations. The main difference you need to learn is that when replacing the value of a variable, *dBASE II* uses REPLACE for a field in a database and STORE for a memory variable. BASIC uses a simple equal sign in both cases. Some other points of comparison follow:

- The *dBASE II* $ statement, which makes reference to the starting position and the number of positions of interest in a character string, is very similar to the BASIC MID$ function.
- The @ function in *dBASE II* searches a character string for a particular substring, as does the INSTR function in BASIC.
- *dBASE II* has two handy string functions that are absent from BASIC. The TRIM function removes trailing blanks from a field, and the ! function converts all characters in the string to upper case.
- Converting a number to a character string is done with the STR$ function in BASIC and the STR function in *dBASE II*. Character-to-number conversion is done with the VAL function in both languages. The LEN function is used in

both languages to determine the length of a character string.

- I could only find one mathematical function in *dBASE II*: the INT function, which is the "floor" function. It returns the largest integer less than or equal to the number input into the function. The same function does the same thing in BASIC, and BASIC has numerous other mathematical functions.
- *dBASE II* has a subset of BASIC's arithmetic operators, but has no exponentiation, integer division, or modulo arithmetic.
- Both languages have essentially the same set of relational or comparison operators. *dBASE II* has a simple subset of the logical operators available in BASIC.
- String concatenation is performed with the same operator, the plus sign (+), in both languages. *dBASE II* has a concatenation with "blank squash" (-) as well, to eliminate unwanted trailing blanks.

Summing Up

dBASE II's relative strengths are predictably in the areas of accessing, displaying, and editing database files. Until comparing it to BASIC I did not realize how limited *dBASE II*'s mathematical functions are.

In many respects, however, familiarity with BASIC may help you get off to a quick start with *dBASE II*.

—William G. Barker

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that follow a structure that will be used repeatedly. The REPORT command meets this need, but most users find that it is by far the weakest aspect of *dBASE II*. The REPORT command asks you to create a report heading to specify which fields to include and create headings for them and to indicate whether subtotals or totals are required. The information is stored in a file for possible future use. This mechanism can meet primitive reporting needs, but the reports are unattractive and the system is inflexible. Anything even slightly more sophisticated or polished requires *dBASE II* programming.

The LOCATE command will search through a database until a match is found.

Since the introduction of *dBASE II*, its programming aspects have been the subject of great debate. Critics of *dBASE II* decry the fact that even casual users need to learn programming techniques to use *dBASE II* efficiently. Others praise the great flexibility that the programming features provide. No one is quite sure whether *dBASE II* is truly a programming language. Strictly speaking, *dBASE II* uses "command files." But, as the old joke goes, if it feels like a programming language, looks like a programming language, and smells like a programming language, then it must be a programming language.

dBASE II command files are text files containing a series of *dBASE II* commands, including most of the ones we've discussed so far. Some commands don't make much sense in a command file; for example, CREATE is intrinsically interactive. The DO command opens a specified command file and sequentially executes the statement therein, much like a PC-DOS BATCH file. What sets *dBASE II* apart from a simple BATCH mechanism is the breadth of the commands available.

The command files can be created with any word processor capable of generating standard text files without imbedded control characters, such as *WordStar* in its nondocument mode. Alternately, *dBASE II* provides a line-oriented screen editor with *WordStar*-like commands, which you invoke with the MODIFY COMMAND filename. Command files in *dBASE II* use the extension .PRG. Until the recent upgrade of the program to Version 2.4, the *dBASE II* editor has been unreliable. One excellent method is to use *WordStar* to enter the commands, and then invoke *dBASE II* with the R(un) option. When a bug shows up, use the QUIT command to leave *dBASE II* and return automatically to *WordStar*, where Ctrl-R can be pressed to select the same file name for editing.

Memory Variables

Like any programming language, *dBASE II* allows variables. Only 64 of these memory variables can exist at one time. However, old variables can be eliminated, if they are no longer needed, to make room for new ones. Variable names can be up to ten characters long, with all positions significant.

No variables exist automatically; each one must be established with the STORE . . . TO command. The syntax is

```
STORE {string/number/logical value}
TO variable name.
```

This means that You define the type of the memory variable (character, numeric or logical) by storing a value of the appropriate type to the variable. Thus,

```
STORE 'This is a string' TO memvar1
```

creates a variable named "memvar1" as a string variable that can only hold string values (note that *dBASE II* can use either single or double quotes to delimit a string),

while STORE 3 TO counter and STORE T TO flag create numeric and logical variable, respectively. In other words, the STORE statement both creates the variable and initializes it to a value.

A special form of the DISPLAY statement, DISPLAY MEMORY, lists all active memory variables, their types, and their current contents. The question mark (?) command can also be used to examine variables, which is useful for debugging. The entire variable memory can be saved to disk with the SAVE TO filename command, which creates a file of type .MEM. You can load the variables back into *dBASE II's* working area with the RESTORE FROM filename command. In earlier versions of *dBASE II*, the RESTORE statement wiped out any existing memory variables. Now a RESTORE ADDITIVE clause can add the variables saved on disk to those in memory.

Conditional branching and execution uses the IF . . . ELSE . . . ENDIF construct. The condition to be tested uses the standard *dBASE II* relational operators, which also work on variables. IFs can be nested as deeply as you like. Text following the ENDIF statement is ignored, so good *dBASE II* programmers often include a comment indicating which IF loop has been terminated.

Another branching method is CASE . . . ENDCASE. This is similar to the CASE statement in Pascal, or SWITCH in the C and other languages. An expression is evaluated, and the program branches to predefined specific routines or executes a group of statements based on the value. *dBASE II* includes an OTHERWISE clause to cover values for which no routine has been programmed.

Loop The Loop

The DO WHILE loop handles repetitive execution. The general syntax is

```
DO WHILE condition <CR> a
group
of statements <CR> ENDDO.
```

DO WHILE's can also be nested. Like WHILE structures in other languages, the loop will be executed only if the condition is true, and something in the loop must indicate that the condition is false for the loop to terminate. Unfortunately, *dBASE II* does not have the REPEAT UNTIL structure or FOR loops found in other structured languages. Similarly, there is no GOTO statement—a much less regrettable omission. In fact, the term FOR is used to indicate the scope of a command. GOTO is used to position the record pointer. The only other loop-oriented command is LOOP, which instructs *dBASE II* to start a loop again and can break from the middle of a loop if a condition is satisfied.

> What sets *dBASE II* apart from a simple BATCH mechanism is the breadth of the commands available.

dBASE II has no procedures or subroutines in the traditional sense. Instead, each command file itself can be considered a procedure. The DO command transfers control to another command file, much like the CHAIN or LOAD,R commands in BASIC. RETURN transfers control back to the calling command file, as in BASIC's return from a subroutine. *dBASE II's* DO . . . RETURN structure thus has aspects of both program chaining and subroutines. Like BASIC, no values can be passed directly to a "subroutine"; the only way to pass values is to use memory variables, which are global from the time they are declared until they are released. This is not the most sophisticated mechanism offered by a programming language, and it can lead to having a large number of command files on disk and some rather awkward programming designs. With some juggling, however, it can handle even complicated jobs.

There are various commands that can display messages to the operator and obtain operator input while a command file is executing. WAIT halts processing and waits for operator input, WAIT TO "memvar" stores the input in a memory variable, INPUT prompt TO memory variable obtains data of any type, and ACCEPT prompt TO memory variable accepts character data only, but without the need for putting characters in quotes.

A more sophisticated mechanism is the "at" sign (@) coordinates SAY prompt statement, which places the prompt at line and column coordinates specified by the programmer. Using @ coordinates SAY without a prompt erases all or a portion of a line, depending on the coordinates. The contents of a field or a memory variable can also be displayed with @ SAY. The GET statement is used to collect input. The command

```
@ 10,10 SAY 'Enter last
name' GET lname
```

displays the prompt at position 10,10 and collects the operator input into memory variable lname. The memory variable must exist before the GET command is executed or an error will result. A series of @ SAY . . . GET statements can be written to structure a full screen display for operator input. The data is not actually collected until a READ statement is executed. SAY . . . USING and GET . . . PICTURE constructs use images like PRINT USING in BASIC to format and limit the output or input.

You can access two databases simultaneously. The command SELECT PRIMARY followed by USE filenamel selects one, and SELECT SECONDARY and USE filename2 chooses the other. You can reference the contents of the fields in either database by preceding the field name with either p. or s.; for example, p.lastname refers to the last name field in the primary database. There is also a mechanism to link the two databases together to simulate a file with more than

32 fields, but this is a tricky maneuver to use and has its limitations.

Merging Traffic

Two powerful commands allow you to merge records from two databases or to join two databases to form a third. The statement

```
UPDATE FROM database ON key
{ADD/REPLACE}
```

adds or replaces data in one database with data from a second database if the contents of a key field are identical in both files. The statement

```
JOIN TO newfile ON expression
```

is even more powerful. JOIN examines each record in a secondary database to see if the expression is true in relation to the first record in the primary database. If so, the secondary record is added to the newfile third database. After all the records in the secondary database have been evaluated, the record pointer is moved to the next record in the primary database and the entire secondary database is examined again.

Other *dBASE II* commands include ERASE to clear the screen, CLEAR to reset *dBASE II* and clear all memory variables, REMARK to include comments, RENAME oldfile TO newfile to rename files, and DELETE FILE filename to erase files from within a *dBASE II* command file. There are various functions available, too, including the number sign (#), which returns the current record number, the asterisk (*) to indicate if a record is deleted, EOF to indicate the end of a data file, exclamation point (!), for variable or string, which converts to uppercase. It also includes the commands TYPE(expression), which indicates whether the expression is character, numeric or logical; FILE(filename/variable/expression) to indicate whether a file exists on disk; TRIM(string) to strip trailing spaces from the right of a string. (This last one is important since *dBASE II* stores string fields padded with blanks on the right.) A final addition is the ampersand (&) variable, which is the "macro substitution" command. *dBASE II* macros have probably created more confusion than any other aspect of the language. All the ampersand does is replace the variable

There are several BASIC-like functions in *dBASE II*.

name with the value contained in the variable. The problems are caused by an apparent inconsistency when *dBASE II* needs something to be "macroized." I often tell beginners to try the macro function if things aren't working as expected when using memory variables, it often solves the problem.

There are several BASIC-like functions in *dBASE II*. INT, VAL, STR, LEN, and CHR work more or less like their BASIC counterparts. RANK(string) works like BASIC's ASC function and returns the ASCII value of the first character of the string. The *dBASE II* function

```
$(expression/variable/
string,start,length)
```

works like MID$, and

```
@(variable/
string1,variable/string2)
```

serves the same purpose as INSTR or MATCH in BASIC.

Like many programs, *dBASE II* has operating characteristics that you can modify if you wish. Also, like other programs, *dBASE II* makes default assumptions about these characteristics unless you tell it otherwise. The SET command is used to modify *dBASE II's* defaults and invoke various options. Some 20 different adjustments can be made, some important and some minor. *dBASE II* now has a DEBUG and TRACE mode to help debugging. The program can also store most activity to a disk file for later analysis, can redirect output to screen or printer and can use files containing screen and report formats.

A utility package named ZIP is supplied with *dBASE II*. ZIP defines screens and reports by "painting" them on a display screen with a word processor. ZIP then creates the appropriate .PRG or .FMT files, usually consisting of the "at" sign (@), SAY and GET and READ statements. ZIP draws primitive boxes around areas of the screen and allows *dBASE II* commands to be embedded in the screen and format files. ZIP can be a timesaver and is a useful addition to the programmer's arsenal.

The New dBase II

A few months ago, Ashton-Tate announced a new upgraded release of *dBASE II*, Version 2.4. The new release adds some useful new features and fixes some of the more notable bugs found in earlier versions. The retail price remains at $700, but registered owners of earlier versions can get an upgrade directly from Ashton-Tate for $75. The upgrade includes completely new documentation in the familiar old binder. The new manual is completely typeset and looks much better. It retains the two-section approach; the first section is a tutorial for beginners, and the second is a reference manual. The writing has improved, especially in the first section.

Programs written in earlier versions will work without modification unless MEM files are used. Version 2.4 uses a

different storage structure, so the memory variables will have to be entered once and resaved. The multiple overlay files of the earlier structure have been combined into one overlay.

The most important new feature is a complete HELP system that provides useful information on *dBASE II* commands and procedures. The help file itself is simply an indexed text file, so a programmer can easily add new help messages or create a completely new text file for users of custom applications. Although accessing the help messages is a slow procedure on a floppy-based system, this capability is a significant enhancement.

Other new features allow some significant programming shortcuts. A TEXT . . . ENDTEXT construct allows you to display or print a block of text without the question mark (?) or "at" sign (@) SAY statements; this can save time if a long segment of text is needed. The RELEASE command now accepts the standard question mark and asterisk wildcard specifications in statements such as

```
RELEASE ALL LIKE test*
```

and

```
RELEASE ALL EXCEPT Global*.
```

An error in a command file now displays a traceback of the nesting of the command files that produced the error. This is useful, but the error messages provided by *dBASE II* itself are still inadequate. On a more positive note, a PACK will now update all INDEX files used with a database. Packing an indexed database was so slow previously that even Ashton-Tate suggesting packing the file with the indexes inactive and later reindexing. This wasn't exactly a speed demon either, and the new method is much faster.

Getting the Bugs Out

Ashton-Tate lists about 37 bugs fixed in the new version. Among the more important fixes are correct nesting of CASE statements, which wouldn't nest at all before; correct operation of the MODIFY COMMAND editor, which would often insert garbage on blank lines or at the end of normal lines; correct handling of numeric pictures in SAY commands; closing of all open command files after a

CANCEL; and correct positioning of the index file after a GOTO RECORD n. Some of these problems had taken me hours to discover because of Ashton-Tate's less than forthright bug reporting. The new version works more consistently and solidly.

Nonetheless, I am a bit disappointed in the new release. While *dBASE II* Version 2.4 is unquestionably better than earlier versions and is clearly worth the reasonable upgrade charge, there is so much that wasn't done. Some of the most annoying limitations of earlier versions are retained intact. The 32-field limit, the restriction to two data files open at a time, and only three classifications of data are unchanged. Any software house has to consider compatibility with earlier versions, but surely there is a way to expand the program to take fuller advantage of hardware advancements.

No program can be all things to all people, but *dBASE II* comes closer than almost any similar program. Getting it to work for you quickly is easy—a remarkable achievement in itself. Ashton-Tate indicates sales of over 150,000 copies, and many of these *dBASE II* users must be relative beginners—there can't be *that* many microcomputer experts around yet. A combination of factors make *dBASE II* especially attractive to novices, including the ease in getting started, the simplicity and speed of effective demonstrations, the 30-day money back guarantee, the heavy advertising push, and the obvious upgrade path as knowledge is gained. There is also a measure of what I call the "*de facto* standard syndrome" involved. Certain programs have achieved such acceptance and popularity that a beginner is loathe to buy anything else. Parasitic products such as *dBASE Window, dNAMES* the Fox and Geller line, and other products which enhance and expand *dBASE II;* texts, disks, and cassettes on how to use the program; and the training seminars around the country—all provide a degree of comfort rare in the purchase of computer software or hardware.

Not for Everyone

This doesn't mean that an entire generation of micro programmers hasn't cursed at the flaky language, its cryptic error messages, its open file and field limitations, and its slowness. But it is interesting to note that serious users are aware of these problems and are willing to live with them. *dBASE II* as a language is very high level; Ashton-Tate's claims that program development time can be reduced tremendously are truly valid. Even extremely complex applications such as full accounting suites have been programmed in *dBASE II*, and the package is excellent for a wide spectrum of applications.

However, *dBASE II* is not inexpensive, and it's certainly not for everyone. And Ashton-Tate agrees; it has released a much simpler file management program called *Friday!*—written in *dBASE II*, no less (see "Spending The Weekend With Friday!" in this issue). Some database management software migrating from the minicomputer world offers superb capabilities that should give *dBASE II* a run for its money. Nonetheless, *dBASE II* is at the top of the list, and I think its going to stay there for a while. ■

COVER STORY/GLENN A. HART AND TYRONE P. PIKE

Advanced dBASE II Programming Tips

By taking advantage of dBASE II's strengths and working around its weaknesses, two programmers have found that this language fits the bill for many applications.

In many ways, *dBASE II* is not a language in the classical sense. As a relational database system, *dBASE II* includes many commands to manipulate data; these commands can be stored in a text file called a command file that *dBASE II* will execute on request. What sets *dBASE II* apart from other programs that also execute stored sequences of commands in a batch-type mode is the inclusion of commands that perform traditional language functions. These include a looping construct, conditional execution and branching, program chaining, and string handling functions. While the available arsenal is rather limited in comparison to other languages, it is sufficient to program most algorithms. These programming functions in combination with *dBASE II*'s full spectrum of data manipulation commands result in an overall package capable of coding even sophisticated and complex applications. The interpretive nature of the *dBASE II* environment offers all the benefits normally associated with interpreters, like ease of on-line debugging by examining and/or changing variable contents and rapid modification and execution of code.

Programming in dBASE II

As a programming environment, *dBASE II* is not without some limitations. The circumscribed programming constructs (no REPEAT UNTIL or FOR loops, for example) can lead to convoluted structure. Error messages are few in number and not especially helpful, and documentation is only fair. Logically correct

code sometimes does not execute as expected, although this problem seems to be reduced in recent *dBASE II* releases. It is almost always possible to recode and obtain proper execution, but the process can be time-consuming and frustrating.

The interpretive nature of *dBASE II* offers all the benefits normally associated with interpreters.

In spite of these and other problems, professional programmers continue to use *dBASE II* as a primary programming language for commercial development. We do most of our work at LAN Systems, Inc., in *dBASE II*. As with any software development effort, several objectives guide our programming activities. We strive to make code as general as possible so it can be used in other contexts. Our code attempts to manage the programming environment as much as possible to maintain control. Internal documentation through use of meaningful variable names and other techniques contributes to ease of maintenance and modification. We often must program around the limitations of *dBASE II* to meet a crucial need.

In this article, we'll assume that the reader is already familiar with the general procedures and commands used by *dBASE II* (for an in-depth look at *dBASE II*, see "The ABCs of dBASE II" in this issue). The program segments shown are not intended to be complete or executable per se. They are conceptual and we intend them to be sufficiently general for any reader to adapt to his or her own applications.

In *dBASE II*, variable names can be up to ten characters long, with all ten positions significant (that is, "cursorpos1" and "cursorpos2" are completely distinct). The manual suggests using only nine characters so that a leading *m* can be added if a memory variable is needed with essentially the same name (for example, "maddress" as a memory variable to hold data intended for field name "address"). Unfortunately, *dBASE II* currently allows only 64 variables to be active at one time. If this is not enough, the RELEASE command can be used to eliminate some active variables. Even if 64 variables are sufficient, it is good practice to clear variables that are no longer needed as a way of reducing clutter in the variable space. This also makes it easy to reuse standard variable names.

```
STORE 'LAN SYSTEMS, INC.' TO Gtitle1
STORE 'Out-of-range entry. Please re-enter.' TO Gmessage1


NOTE -- Gloclpath comes from a data file, contains the path for
NOTE -- this user. Gfilesufx contains the three character client
NOTE -- code.

STORE Gloclpath + 'mastr' + Gfilesufx TO Lfile
STORE Gloclpath + 'mnumb' + Gfilesufx TO Lfile
STORE Gloclpath + 'mname' + Gfilesufx TO Lfile

USE &Lfile INDEX &Lidx1, &Lidx2

@ 1,25 SAY Gtitle1

STORE 1 TO Lcounter
STORE 1 TO Slinecount
STORE 1 TO Scolcount
STORE T TO Lentering

DO WHILE Lentering

     NOTE -- get some data or whatever

     ...

     NOTE -- print a report

     DO printrep

     NOTE -- printrep has access to all open variables

     ...

     NOTE -- clear semi-global variables

     RELEASE ALL LIKE S*

     NOTE -- do some more processing

     ...

     NOTE -- maybe use a delay loop

     DO WHILE Lcounter < 150
          STORE Lcounter + 1 TO Lcounter
     ENDDO delay loop

     STORE F TO Lentering

     ENDDO Lentering

     NOTE -- clear local variables and return to previous module

     RELEASE ALL LIKE L*
     RETURN
```

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Figure 1: *This listing illustrates the use of extended variable and filenames.*

Clearing Variables

In the past, clearing variables required one or more RELEASE commands followed, possibly, by a long list of each and every variable name to clear. The newest version of *dBASE II, 2.4*, expands the RELEASE command to allow such variations as RELEASE ALL LIKE and

```
NOTE -- customer number previously provided by user

STORE custnum TO Lnumkey

NOTE -- Primary file is the master customer file
NOTE -- Secondary file is the file with the contact names

SELECT SECONDARY

STORE Glocipath - 'conts' - Gfilesufx TO Lfile
STORE Glocipath - 'conti' - Gfilesufx TO Lidx1

USE &Lfile INDEX &Lidx1

STORE 0 TO Lcounter
NOTE -- Lcounter stores the contact number

STORE T TO Lcontmore

DO WHILE Lcontmore

     STORE Lcounter + 1 TO Lcounter

     NOTE -- The key for the contact is built by concatenating
     NOTE -- the customer number and a string version of the
     NOTE -- current counter value. This demo version takes only
     NOTE -- single digit counters, but the number of contacts
     NOTE -- can be two, three or four digits if desired.

     STORE Lnumkey - STR(Lcounter,1,0) TO Lcontkey

     FIND &Lcontkey

     IF #=0
          STORE F TO Lcontmore

          NOTE -- No contacts found. Actual program would
          NOTE -- display an appropriate message and solicit
          NOTE -- another customer number

     ELSE

          NOTE -- Contact record found
          NOTE -- conname, contitle, etc. are the field names
          NOTE -- in the contact file

          @ 16,5 SAY 'Contact Name  #' - STR(Lcounter,1,0);
               - ' :' - conname
          @ 17,5 SAY '             Title:' - contitle
          @ 16,55 SAY 'TEL:' - contel
          @ 17,63 SAY 'Ext:' - conext

          STORE 'Y' TO Lreply1

          @ 21,20 SAY 'DISPLAY MORE CONTACTS? (Y/N)';
               GET Lreply1 PICTURE '!'
          READ

          IF Lreply1 = 'Y'

               STORE T TO Lcontmore
          ELSE
               STORE F TO Lcontmore

          ENDIF wants more contacts

          NOTE -- Clear message lines
          @ 21,20
          @ 22,20

     ENDIF Contact record found

ENDDO Lcontmore
RETURN
```

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Figure 2: *This fragment shows a method of getting around* dBASE II*'s field limit with a multifile, keyed indexing scheme.*

RELEASE ALL EXCEPT, each of which can be followed by a wildcard file list specification using the question mark (?) and asterisk (*), the normal DOS wildcard characters.

We suggest an alternative use of the first character of each variable name. All *dBASE II* variables are global when declared; until RELEASED they are available to any executing program. To clarify program structure and variable usage, we precede truly global variables (those that we really want in use in many modules) with a capital *G*. An *L* is used for variables local to a given program module, which are usually things like loop variables and counters. Our practice is to enter *dBASE II* commands all in uppercase and anything we've created, like field, variable, and file names, all in lowercase except for the first character. This makes it easier to read the code and allows us to use the initial character of the variable name without sacrificing readability.

> Statements like RELEASE or RELEASE ALL LIKE L* control what variables live or die across program invocation.

We've also found that a third class of variables is useful to add clarity. For want of a better term, we use *S* for Semi-global. Such a variable is used in more than one module, usually well down in a program tree, but is not really fully global in that it is not needed everywhere. A good example would be a variable like Slinecount, which might be needed to generate a report with two or three modules but serves no purpose once the report is completed.

Once this method is implemented, maintaining the variable pool becomes

much easier. We can now use statements like RELEASE ALL EXCEPT G* or RELEASE ALL LIKE L* to control what variables live or die across program invocation. Figure 1 shows how we might use this technique; it also shows the rather roundabout way we specify filenames. The first five positions of the filename indicate the purpose of the file, and the last three indicate the client name (we don't touch the standard three-character filetypes used by *dBASE II*, of course). We also set a global variable named Glocl-path, which obtains its value from a password/environment file with entries for each potential user of the system. This variable currently stores just a disk drive designator, but it could also accommodate MS-DOS hierarchical path names if this capability becomes available in future versions of *dBASE II*. In an Ethernet network, this path procedure can make finding the appropriate files transparent to the user. Finally, we assign the full filename that has been constructed to local variables such as Lfile and Lidxl. This allows simple maintenance and makes the code generic and suitable for use in other contexts.

In an Ethernet network, the path procedure can make finding the appropriate files transparent to the user.

An Infinite Number of Fields

dBASE II allows a total of only 32 fields in a database. While this is frequently enough for serious applications, it sometimes falls short of what is needed. One system we designed needed to store multiple contact names. Normal *dBASE II*

```
        ERASE

        NOTE -- Establish memory variables to store user input

        STORE '                    ' TO Lcity
        STORE '  ' TO Lstate
        STORE '     ' TO Lzipmin
        STORE '     ' TO Lzipmax
        STORE '        ' TO Linterest

        NOTE -- Create and initialize search string

        STORE '.NOT. *' TO Gsearch


        @  4,28 SAY 'DEFINE SEARCH CRITERIA'

        @  6,10 SAY 'Enter as much or as little of each field as you'
        @  7,10 SAY 'want to scan (or nothing at all in a field).'
        @  8,10 SAY 'Use MIN Zip for a normal scan, both MIN and MAX'
        @  9,10 SAY 'to search between two values.'

@ 12,6  SAY 'City ' GET Lcity PICTURE 'XXXXXXXXXXXXXXXXXXX'
@ 12,35 SAY 'State ' GET Lstate PICTURE '!!'
@ 12,46 SAY 'Zip Code MIN ' GET Lzipmin PICTURE '99999'
@ 12,67 SAY 'MAX ' GET Lzipmax PICTURE '99999'
@ 14,12 SAY 'Area of Interest ' GET Linterest PICTURE '!!!!!!!!'

READ

STORE T TO Lmore

DO WHILE Lmore
     STORE 'N' TO Lreply1
     @ 20,20 SAY 'ANY CHANGES? (Y/N)' GET Lreply1 PICTURE '!'
     READ
     IF Lreply1 # 'N'
          STORE T TO Lmore
     ELSE
          STORE F TO Lmore
     ENDIF Lreply1
ENDDO Lmore

NOTE -- If user has not entered ANY search criteria, RETURN
NOTE -- to calling module

IF $(Lcity,1,1) = ' ' .AND. $(Lstate,1,1) = ' '
     .AND. $(Lzipmin,1,1) = ' ' .AND. $(Lzipmax,1,1) = ' '
     .AND. $(Linterest,1,1) = ' '

     RELEASE ALL EXCEPT G*
     RETURN

ENDIF no search fields entered

IF $(Lcity,1,1) <> ' '

     NOTE -- TRIM trailing blanks from user input

     STORE TRIM(Lcity) TO Lcity

     NOTE -- Convert the length of the user input to a
     NOTE -- string variable

     STORE STR(LEN(Lcity),2) TO Llentemp

     NOTE -- Concatenate current Gsearch string value, .AND.
     NOTE -- connector and search criterion. '&Lcity' is the
     NOTE -- macroized user input, $(city,1,&Llentemp)
     NOTE -- references the city field in the database, using
     NOTE -- the substring function (like BASIC's MID$ function)
     NOTE -- to restrict the search to the first character
     NOTE -- through the character number matching how many
     NOTE -- characters the user entered.
```

Figure 3: *This is an abbreviated version of the code that the authors came up with to allow a multiple field search.*

```
     STORE Gsearch + ' .AND. ' + "'&Lcity'=$(city,1,&Llentemp)";
          TO Gsearch

ENDIF Lcity

NOTE -- Similar algorithm for the other fields

IF $(Lstate,1,1) <> ' '

     STORE TRIM(Lstate) TO Lstate
     STORE STR(LEN(Lstate),2) TO Llentemp
     STORE Gsearch + '.AND.' + "'&Lstate'=$(state,1,&Llentemp)";
          TO Gsearch

ENDIF Lstate

NOTE -- If only a minimum zip code was entered by the user,
NOTE -- then handle as above. If user entered something in
NOTE -- BOTH minimum & maximum zips, set up the 'between'
NOTE -- search. Entering a value only for the maximum zip
NOTE -- isn't allowed.

IF $(Lzipmin,1,1) <> ' ' .AND. $(Lzipmax,1,1) = ' '

     STORE TRIM(Lzipmin) TO Lzipmin
     STORE STR(LEN(Lzipmin),2) TO Llentemp
     STORE Gsearch + ' .AND. ' + "'&Lzipmin'=$(zip,1,&Llentemp)";
          TO Gsearch

ENDIF only a zip to match entered

IF $(Lzipmin,1,1) <> ' ' .AND. $(Lzipmax,1,1) <> ' '

     STORE TRIM(Lzipmin) TO Lzipmin
     STORE TRIM(Lzipmax) TO Lzipmax
     STORE STR(LEN(Lzipmin),2) TO Llentemp
     STORE STR(LEN(Lzipmax),2) TO Llentemp2
     STORE Gsearch + ' .AND. ' +;
          "$(zip,1,&Llentemp) >= '&Lzipmin' .AND. ";
          "$(zip,1,&Llentemp2) <= '&Lzipmax'";
               TO Gsearch

ENDIF a range of zips to match has been entered

IF $(Lzipmin,1,1) = ' ' .AND. $(Lzipmax,1,1) <> ' '

     @ 21,12 SAY;
          "Can't enter just Zip MAX. Use ONLY Zip MIN for normal scan."

     NOTE - Delay loop
     STORE 50 TO Lcount
     DO WHILE Lcount <> 0
          STORE Lcount - 1 TO Lcount
     ENDDO

     @ 21,12

     NOTE -- Start process over.
     ...

ENDIF user entered just a Zip MAX - start over

IF $(Linterest,1,1) <> ' '

     STORE TRIM(Linterest) TO Linterest
     STORE STR(LEN(Linterest),2) TO Llentemp
     STORE Gsearch + ' .AND. ' + "'&Linterest'=$(interest,1,&Llentemp)";
          TO Gsearch

ENDIF Linterest

RELEASE ALL EXCEPT G*

RETURN
```

(continued)

programming would require some maximum number of contacts to be defined, with a field assigned to each. If information like the contact's extension number is needed as well, each contact then occupies two fields. The 32-field *dBASE II* maximum rears its ugly head quickly; this particular application required storing up to several dozen contacts for each customer, each with a contact name, title, telephone number, and extension.

Normal *dBASE II* programming would require some maximum number of contacts to be defined, with a field assigned to each.

Our solution was to implement a multifile, keyed indexing scheme that can simulate an almost unlimited number of fields. Each customer is assigned a unique customer identification number of up to six digits that are stored in character form. A secondary database file is structured with five fields, one each for the customer number key, name, title, telephone number, and extension. The customer number/contact key is generated by concatenating the customer number with a string representation of the contact number (assigned sequentially when the contacts were entered). By incrementing a local counter and rebuilding a search key, we could display each contact in order. We have also used a similar structure to store comments and other textual information. In this case, there are various methods to start the display with the highest numbered item and work backwards, so the most recent item is displayed first.

Figure 2 is a fragment showing how this scheme can display as many contacts

as have been stored for a given customer. Once the user enters the customer number, *dBASE II* displays the contact information. Note the use of an onscreen window. The main customer information is shown on the top portion of the screen (not included in the listing), while each individual contact is shown in a small area. This is a useful method of segmenting the screen for clarity. On PC versions, we have drawn boxes around window areas and used other available graphics characters and color to further enhance the screen.

Several *dBASE II* functions are devoted to string manipulation. While they aren't as numerous as in BASIC or most other high-level languages, the *dBASE II* string functions can be used in some interesting ways.

Most *dBASE II* applications employ some form of query mechanism to examine records that meet a selection criterion, often entered on-line by the user. Alternatively, the programmer can precode certain combinations of field parameters for the user to choose. Letting the user enter values for several fields of his or her choosing and searching on some combined, multiple selection criteria presents a more complicated case.

Our objective in a recent project was to paint a screen with multiple fields and let the user specify as much or as little of any or all of the fields as he or she wanted. A search through a customer database would then be executed based on the combined criteria the user selected.

Stringing Along

Figure 3 is an abbreviated version of the actual code that solved the problem. The screen is painted and the user enters his or her criteria. Even one character in any field is enough to trigger a search on that field. A string is built using the *dBASE II* macro function that establishes an expression based on the substring function. If one character is entered, the search string looks for a match for that character in the first position of the database field. If more than one character is entered, the corresponding number of characters in the field is checked.

(Figure 3 continued)

```
To use the search string defined above, code like the following
can be used:

LOCATE FOR &Gsearch

IF EOF

     @ 21,10 SAY ;

          'No matching records found. Enter a new Selection Criteria.'

     NOTE -- process situation

     ...

ELSE

     NOTE -- print or display matching records

     ...

ENDIF
```

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The example provided also allows the user to enter a minimum and maximum zip code and builds the search string to find matching zip codes between these two extremes. This code can accommodate many other arrangements. A major issue in structuring such a multifield search is the connector between each criterion. The example uses the .AND. connector for simplicity, so each additional selection made by the user narrows the search down further. Using .OR. and/or a combination of the two connectors can generate more complex selection criteria at the expense of added complexity in both coding and the user interface. We have designed such systems, but Figure 3 should provide enough indication of the concept to allow for expansion in various ways.

> dBASE II slows down drastically if more than a couple of indices are maintained on-line.

The method we used employs LOCATE to scan the database file, which is slower than using FIND on indexed fields. The benefit of the version shown is that any character field can be scanned, whether it is indexed or not. Since *dBASE II* can only maintain seven indices in relation to a given database (and the program slows down drastically if more than a couple of indices are maintained on-line), this method offers greater flexibility. It may be possible to construct a version of this algorithm using keyed FINDs if all relevant fields are known to be indexed, but we haven't tried it.

We hope that the examples and methods given in this article will provide some food for thought to advanced *dBASE II* programmers. As a language, *dBASE II* can do much more than one might expect. We've found it a productive and profitable environment for commercial programming, and we continue to learn new things about its capabilities every day. ■

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From Basement To Boardroom

dBASE II author Wayne Ratliff recounts the program's history, describes its current success, and explores possible applications in the area of Artificial Intelligence.

The remarkable success of Ashton-Tate's *dBASE II* is now a computer legend. Yet, this popular database management system had very humble beginnings.

Only 6 years ago, its author, Wayne Ratliff, an engineer, worked as a Martin Marietta consultant to NASA's Viking space program. He created *Vulcan*, *dBASE II*'s ancestor, not to organize data from space, but to pick teams in football betting pools. *dBASE II*'s uses are now so numerous that the software is often thought of as a computer language in its own right, and it has created its own market for compatible enhancements and applications. *dBASE II* once even returned home to the space program—to save a $100-million satellite launched by the space shuttle.

PC Magazine asked Dave Powell to interview Ratliff to learn more about *dBASE II*'s birth, growing pains, current status, and future. During the conversation, Ratliff offers advice on how to use—and not abuse—his brainchild, as well as insights about this country's software industry in general.

PC: When did you begin developing *dBASE II*?

RATLIFF: *I formally started developing it in January 1978, though the idea occurred to me years earlier while I was in the midst of analyzing football pools. Four weeks into the season, my entire room had become covered with Monday morning newspapers containing the information I needed to make my final picks. I realized there must be a better way to assemble and analyze this information, so I started writing a computer program. But I wanted the program to do more than just analyze football pools. Within a week, the whole idea had grown into something very intelligent.*

PC: What system were you using at the time?

RATLIFF: *One of my friends at that time had just bought an IMSAI, an early hobbyist microcomputer. It was good to experiment with, so I got one too.*

Before long I decided that any intelligent software system had to have a database; to analyze football pools, you need to store numbers somewhere. So I started writing a database program in IMSAI assembly language. By accident, I soon

discovered a program at NASA's Jet Propulsion Laboratory called JPL DIS (JPL Display and Information System).

PC: Which you modeled *dBASE II* after?

RATLIFF: *In some respects,* JPL DIS *was nice because it was simple. I thought it would be easy to implement on a microcomputer. I also looked at ISAM (Indexed Sequential Access Method) but thought it a little difficult. I had recently written a database management system for the Viking space program's Lander Project, but it was a primitive program compared with* dBASE II.

> I needed to concentrate more on the program and let someone else do the marketing.

PC: You didn't really have any project team to speak of up to this point.

RATLIFF: *Right. But I got encouragement from Jeb Long, one of my friends at JPL. Jeb had taken over the* JPL DIS *program in its infancy and essentially completed it. He was very supportive.*

PC: Which features of *dBASE II* can be traced back to Jeb's *JPL DIS*?

RATLIFF: *Some of the most basic commands , like STORE, DISPLAY and LIST, are directly from* DIS. *However, all the commands that deal with the full-screen display are beyond* DIS, *as are B-TREE and other indexing commands.*

PC: In 1979, what percentage of software was in its current form?

RATLIFF: *If you look at lines of code, I expect it was about 25 percent of what it is now. If you look at functions, I'd say about 50 percent.*

First Marketing Attempts

PC: When did you begin marketing the program?

RATLIFF: *I started marketing the program, then called* Vulcan, *myself. I advertised it in the October 1979 issue of* Byte, *and continued advertising up to, I believe, August 1980. By 1980, I was running full half-page ads, and the program was selling well.*

But I was really burned out. I was still working at JPL, coming home at night and trying to run my business, making software changes, responding to inquiries from Byte's *readers, handling correspondence and telephone calls, and also shipping the product. It was all a one-man show.*

PC: How did you handle the pressure?

RATLIFF: *I kept looking for easier ways to do things.* Vulcan *itself helped. When I received* Byte's *response cards, I entered the names into a* Vulcan *database and printed personal replies. But even with that help, the workload got to be too much. I wrote a form letter and had a thousand copies printed. Eventually, even that got to be too much work. The interest in* Vulcan *kept rising.*

PC: How did you handle copying the software for customers?

RATLIFF: *Just by copying one floppy disk to a second drive.*

PC: Which isn't exactly a fast way to do it.

RATLIFF: *No, but I sold only 60 copies of* Vulcan *over a 9-month period, so the copying load wasn't too bad. I had other problems to contend with though. For example, when I prepared the first version of the user's manual, I didn't ask the printer to collate the pages. I had to assemble each 70-page manual by hand—I had piles of pages all over my bedroom. On the second printing, I had the pages collated.*

PC: How did you link up with Ashton-Tate?

RATLIFF: *After a while, I decided I needed to concentrate more on the program and let someone else do the marketing. I had started talking with a professor in Seattle about marketing when two other guys came along—Hal Lashlee and Hal Pawluk. Hal Lashlee is George Tate's partner and Pawluk is with Abert, Newhoff, and Burr, Ashton-Tate's advertising agency. They were selling discount software and already had several small software businesses. They were incorporated, had employees, telephones and computers. I decided to go with Ashton-Tate. After we began our collaboration, George Tate, Hal Lashlee, Hal Pawluk and I sat down and asked, "What changes do we need to make to* Vulcan*?" And, although I really liked the product's name, we decided to change it right away.*

Vulcan Becomes dBASE II

PC: Because the name didn't describe the product?

RATLIFF: *No, because Harris Comput-*

ers, in Fort Lauderdale, Florida, already had an operating system called "Vulcan." Hal Pawluk created the "dBASE"

> The software is incomplete. There are omissions for other software developers to fill.

name. I really think a large part of dBASE II*'s success is due to Hal Pawluk's advertising genius. I had thought of the name a long time earlier, but I thought it sounded too close to "debasing." So I dismissed it. Hal's stroke of genius was the small "d," which has really caught on. There's something about the "d" that makes the program memorable and usable. A lot of other products—*dGRAPH, dUTIL, dPROGRAMMER *and dozens more—are now capitalizing on that little "d".*

PC: What else did Hal do that you particularly liked?

RATLIFF: *He wrote an ad that I didn't like but that really got attention. The famous "*dBASE II*-versus-the-bilge-pump" ad was totally Hal's idea.*

PC: Bilge pump?

RATLIFF: *Yes. It said, "We all know that bilge pumps suck . . . by now we've learned that most software does too . . ." or words to that effect. A number of people called in and said they really didn't like the ad's connotations. We ran the ad off and on for a year. It did get attention.*

PC: Besides the product name and the ad, to what else do you attribute *dBASE II*'s success?

RATLIFF: *We've created a lot of allies instead of enemies. Hundreds of products now work with* dBASE II. *If they weren't with us, they'd be against us.*

Lucrative Omissions

PC: *dBASE II*'s success must come from within the software, then?

RATLIFF: *I guess so . You might say it's because the software is incomplete. There are "problems" with* dBASE*—omissions for other software developers to fill.*

PC: What omissions does *dBASE II* have that the market has, or hasn't yet, addressed?

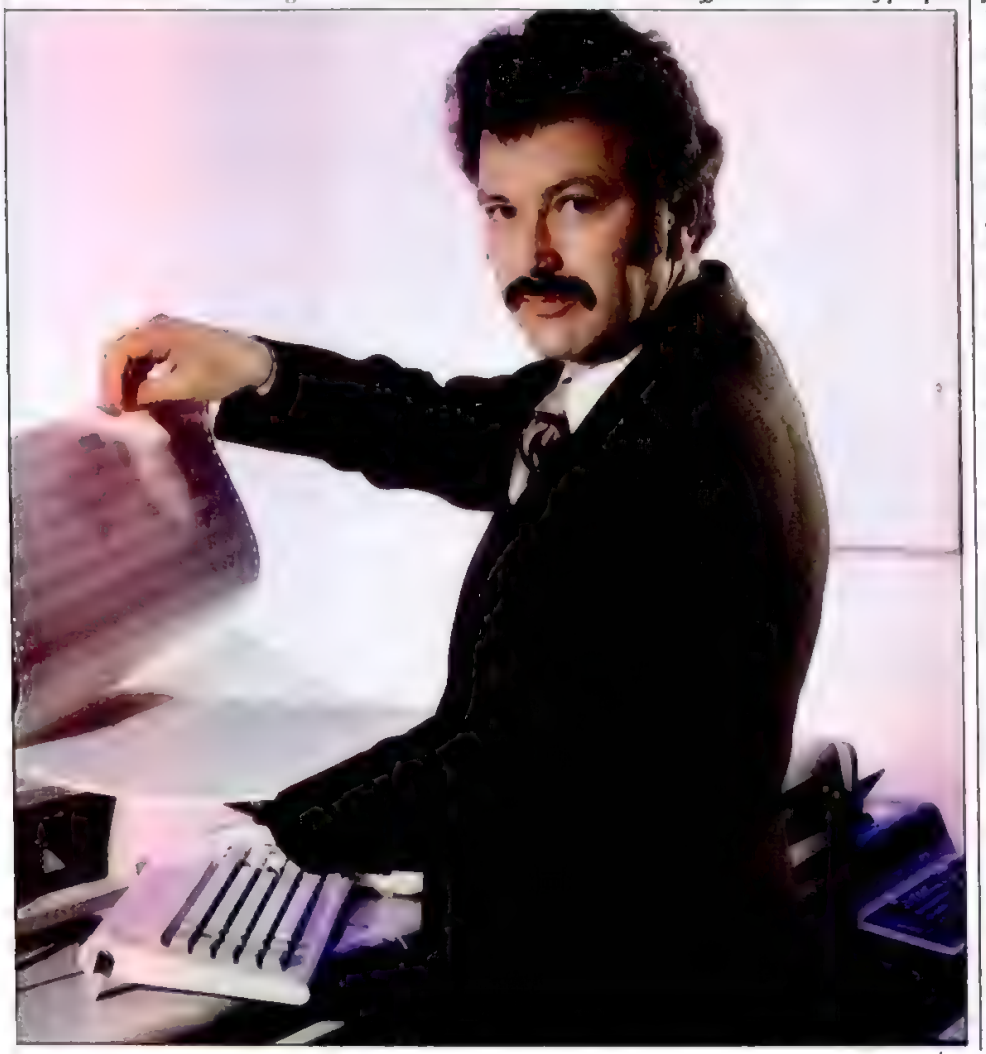
RATLIFF: *In my mind, one of the omissions has been the SORT. When I wrote the SORT part of* dBASE, *back in the floppy-disk era, I wanted to keep disk utilization to a minimum. Nobody had hard disks, and I wanted the SORT to fit into available memory. The program I wrote used about 10,000 bytes of available memory, which was tight, and no disk space. Also, I wasn't too concerned about execution speed.*

Although dBASE*'s SORT was small, ugly, and slow, it fit my design criteria, so I was happy. However, experience has shown that everybody wants a sort program to be extremely fast. We are working on* dBASE*'s SORT now, but our new one won't go on the market for months. However, probably four or five other products are out now that address the problem. The mere fact that* dBASE*'s SORT wasn't speedy created a marketing opportunity for other people.*

PC: Any other examples?

RATLIFF: *Another has to do with what you'd call "forms building" or "full-screen designing." Users want to be able to create full screen formats without having to figure out formatting commands.*

(continued)



PHOTOGRAPH: Roger Ressmeyer/Starlight

They just want to build the formats right on the screen. I didn't put this capability into dBASE, *so several other products, such as* Quick Screen, *were created to do that. An other example would be graphics. We haven't addressed that issue to date, but Fox & Geller has come out with* dGRAPH. *We also haven't addressed statistics, but* Abstat *does.*

PC: Have users themselves brought any "faults" to your attention?

RATLIFF: *There is one that people talk about a lot, but I don't believe it's a fault. Many people are concerned that* dBASE *only allows up to 32 data fields. Well, in* Vulcan *it was 16, and I thought 16 was enough. I reluctantly agreed to bring it up to 32. I've received letters at Ashton-Tate that say it ought to be 255, or some other large number.*

PC: With 255 data fields, you'd need a database management system just to keep track of your access points.

RATLIFF: *Yes, there's a penalty, which is generally in speed and performance. You can have 10,000 fields if you want, but the software is going to run rather slowly. The one real problem with* dBASE *and* Vulcan *has been the lack of available memory on 8-bit computers which are the most common. We had to carefully select what went into the program.*

From the beginning I've adjudicated all change requests, even those from Ashton-Tate.

PC: Do you believe *dBASE II* is open for outside entrepreneurial improvement in any other areas?

RATLIFF: *The biggest area for general development right now is application. Ashton-Tate is trying to assist people in the business end in marketing and advertising. We have an applications "facility" where people can send in programs they've developed, and Ashton-Tate will spread the word, without endorsing the products.*

PC: What has been *dBASE II*'s hardware evolution? You started on the IMSAI.

RATLIFF: *Yes, under the Processor Technology Disk Operating System. Later, we moved to CP/M. But during all of that time, the CPU was the 8080, even though everybody else seemed to be using the Z80. We stuck with the 8080 for upward compatibility. Almost anything that runs on the Z80, but not the reverse. Then, about mid-1982, we did a code translation over to the 16-bit 8086, which is where* dBASE *stands now.*

> *dBASE* shortened the feedback loop from satellite to ground to satellite which to my mind saved the spacecraft.

dBASE In Space

PC: You developed *dBASE II* while working on the space program. Did NASA ever use the software?

RATLIFF: *Yes. On one of the recent space shuttle missions, a $100-million satellite was launched, but it failed to reach the right orbit. I may be overstating a little, but* dBASE *saved the satellite.*

PC: How so?

RATLIFF: *Because of the satellite's unexpected orbit, or perhaps, because of the unusual data coming back, the JPL was unable to process the satellite data it was receiving and didn't know what steps to take to correct the problem. They had to reprogram the satellite's onboard computer to find out what went wrong with the spacecraft.*

I believe the satellite-support software was a very large assembly-language program, which could take months to study and modify. SPACECOM had heard that Bob Byers, a friend of mine who worked with me on Vulcan *and* dBASE, *had a program (*dBASE*), which was easy to work with. He was asked to build a new telemetry link with the satellite, using* dBASE *as a "funnel" processor. JPL could then receive incoming satellite data, process it, and pass it along to those who needed to see it.*

PC: What exactly did *dBASE* do?

RATLIFF: *It acted as a receiver and archiver for engineering data coming down. It processed this data and put it on disk in a form that allowed further analysis and troubleshooting. Essentially,* dBASE *shortened the feedback loop from satellite to ground to satellite, which to my mind, saved the spacecraft.*

PC: What is your current relationship with Ashton–Tate?

RATLIFF: *Although until recently we were separate companies, I'm now the vice president of new technology for Ashton-Tate. I left Jet Propulsion Laboratory in the middle of 1982 and joined Ashton-Tate the following August.*

PC: Will you be more involved in writing new programs or in specifying new products?

RATLIFF: *I'll be more involved in specifying than writing. I see my future role as more of an integrator. I have definite ideas I want to pursue, but I don't think sitting in front of a keyboard and writing programs is the best way to use my time. I think the best use is to find people and programs to build new products. This fits better into the big picture I'm trying to paint.*

Artificial Intelligence

PC: What is this "big picture"?

RATLIFF: *I have to be a little careful about what I answer. It's probably safe to say Artificial Intelligence.*

PC: May I assume you are concentrating on the desktop computer market, since even some of these small machines now offer 32-bit word lengths?

RATLIFF: *Yes.*

PC: How would you define Artificial Intelligence?

RATLIFF: *One way to define Artificial Intelligence is "making computers easier to use." However, we don't just want to make them five percent easier to use, we*

want to make them dramatically *easier to use. We are looking for a breakthrough. Eventually, what we want Artificial Intelligence to do is to take over mechanical duties, to free people for nonmechanical things. I want to see computers in my lifetime—preferably in my hand—performing chores in a human, nonrigid, easy-to-use way. I'd like to be able to tell the computer, "Go and total all the checks I wrote in the last 10 years for medical expenses." That's a nonrigid request.*

PC: Do you foresee that *dBASE II* will be a nucleus for an artificially intelligent system?

RATLIFF: *I think* dBASE *probably could be the "engine" and do a lot of the work. But, as a percentage of the program* dBASE *itself would play a relatively small part.*

PC: But could, or will, *dBASE*'s ability to set up keywords and comparative criteria aid development of such systems?

RATLIFF: *That aspect of* dBASE *is certainly a step in the right direction. However, the problem with using* dBASE *that way is that the system is very "hard-wired." When you command it to LOCATE something,* dBASE *doesn't look up the word's meaning in a dictionary, it searches its memory for an "L." If it finds one, it looks for an "O." Then a "C." And so on. It's a very mechanical very hard-wired process. If software is to become more boundless, it has to look for meaning, rather than for bits.*

Using dBASE II Right

PC: So far, we've discussed *dBASE II*'s history and hinted at its future. Can you add any recommendations for its proper use by today's user?

RATLIFF: *First, read the manual. In it, we try to show how we think* dBASE *should be used. Second, don't get fancy. Whenever you stray too far from a program's intended uses, you're asking for trouble.*

PC: Any particular examples?

RATLIFF: *Users shouldn't try to force really exotic screen and printer controls from the system. They also shouldn't try to defeat the system by figuring out how to patch out features that they don't like. There had better be a tremendous advantage to eliminating those features because you never can tell what you might mess up.*

PC: What are your immediate future plans?

RATLIFF: *We're rewriting the package in the C language. I'm spending most of my time on that.*

Whenever you stray too far from a program's intended uses, you're asking for trouble.

PC: Why C?

RATLIFF: *Most microcomputers in which we are now interested use C compilers. It's hard to find one that doesn't, so you can transport C software to practically any microcomputer.*

PC: Isn't PASCAL equally transportable?

RATLIFF: *No. C's availability and transportability is much higher than PASCAL's. In addition, I don't think* dBASE *could be written in PASCAL.*

PC: Why not?

RATLIFF: *PASCAL doesn't handle the keyboard correctly. The user is always one character behind. I suspect that every commercially available version of PASCAL has solved that problem, but each one in a different way.*

Also, standard PASCAL doesn't lend itself well to modular compilations. A whole program has to be compiled as a unit which means a program as large as dBASE *could take an hour to compile.*

PC: Will the end user see any new features in the C version?

RATLIFF: *Yes, but that's as much as I can say. Essentially, the new* dBASE *will be rewritten from scratch. All the things I didn't like in the original are changed.*

Ashton-Tate's C version of dBASE is now running, and it appears to be fine. We are testing it for bugs now, but the bug rate appears to be very low. The package should go to the next testing step very soon.

PC: Have you ever thought about writing another software package, and starting another company to market it?

RATLIFF: *I often think about writing a new program, but seldom about marketing it. So far, I've worked 6 years on* dBASE, *putting in 16-hour days and 7-day weeks. I'm torn between wanting to do it again and wanting to live life a little.*

PC: How do you feel about the pressure from competing products?

RATLIFF: *The competition depresses me sometimes, as last Friday, when I saw a copy of* Infoworld *with a big color advertisement saying how much better some product was than* dBASE II. *When I was writing* Vulcan, Datastar *came out, and I thought I'd be wiped out. I've had the same feeling many times since—with* Infostar, Knowledge Man *and countless others. But so far, the end hasn't come . . . knock on wood.*

PC: You sound like a parent.

RATLIFF: *I do feel a strong responsibility for* dBASE. *Once we've sold it to customers, we have the money in hand, but I continue to want customers to be happy with it. It means a lot to me that 3 years later people say they are glad they bought the product.*

PC: Coming full circle from *dBASE's origins, did you ever use it to analyze your football pools?*

RATLIFF: *No, I didn't. In the past 6 years I've only had time to watch two or three football games.* ■

David Powell has been a computer programmer, a computer journal editor, and a senior public relations representative for Data General Corporation. He now runs Wordframe, his own freelance writing company, in Brookline, Massachusetts.

COVER STORY/BARBARA KRASNOFF

The Many Faces Of dBASE II

As a programming language, dBASE II has been showing up in all the best places, from restaurants to golf courses, from schools to racetracks.

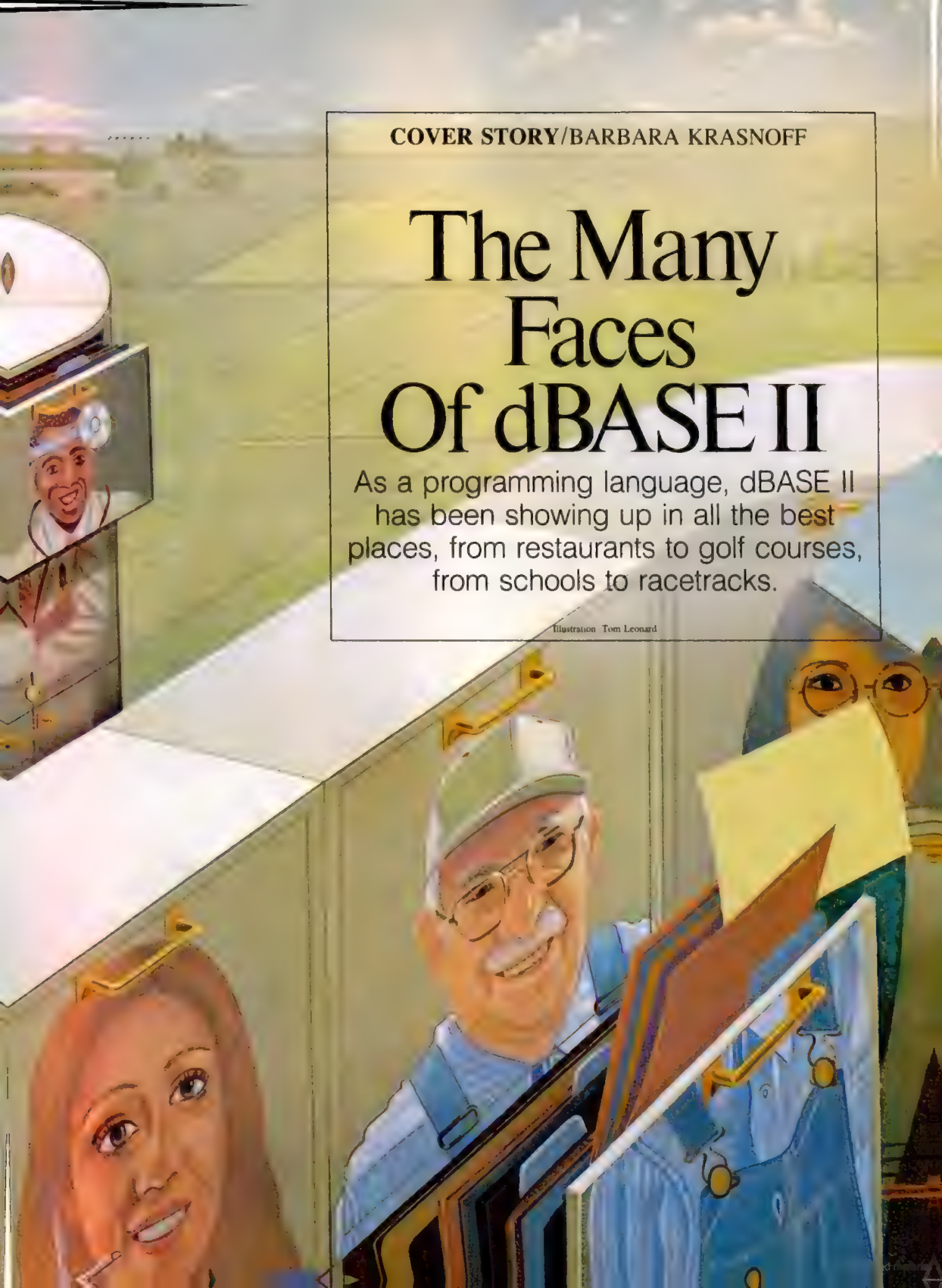


Illustration Tom Leonard

When George Tate first introduced *dBASE II* to the microcomputing world, back in January 1981, it was hailed as an efficient and useful tool for enterprises that did not need or could not afford more complex management software. Great for accountants and small businesses—but pretty boring for the rest of us. Right?

The folks at Ashton-Tate found that *dBASE II* purchasers were not only using it as a database manager, they were also writing programs in the applications development language. In response to this computer creativity, in early 1983 the company introduced its *dBASE RunTime* software package, which has allowed independent software developers to market and protect their *dBASE II* programs.

The result was a proliferation of programs to suit every conceivable need. No longer is *dBASE II* restricted to mundane accounting applications. It is now used for almost anything you might think of (and a few you might not)—from keeping track of infections to keeping tabs on golf scores; from following horse races to following political races; from counting hair cuts to counting class cutters. An eclectic group of *dBASE II* programmers have taken George Tate's baby and helped it grow into a multifaceted language. Here's a look at some of *dBASE*'s faces.

Computerized Restauranteur

Robert A. Kimsey, an engineer with a good deal of programming experience, is also part-owner of a restaurant chain called the Sizzler restaurant, which has franchises in Utah, Idaho, and Nevada. Recently, he merged his skills as a programmer and a restauranteur and using *dBASE II*, came up with *Restaurant Manager*. It developed, he said, "out of our own need, and the belief that we could encapsulate our experience into software to give our managers some tools to enable them to do their jobs more effectively."

The program is divided into four modules. The first, "Inventory," allows the user to set up the items in a restaurant's inventory and thereafter take periodic inventory counts. "Sales" keeps track of sales, analyzes each item on the restaurant's menu and prints weekly summaries of sales, customer counts, and food costs. "Payroll" keeps track of time cards and month-to-date labor costs, and prints out a payroll summary at the end of each pay period that includes tips and tip credits. Finally, "Invoice" keeps track of all invoices, summarized by vendor or by general-ledger account number, and provides an end-of-the-month summary of all expenses.

Kimsey has used *Restaurant Manager* in 20 of his restaurants. "It's working quite well," he said. "A lot of the savings have been made in management time, in improving the accuracy of our records, and in making it possible to store certain types of records that a restaurant manager normally wouldn't have time to save.

Playing Hookey

Students who are frequently absent from school, and those who are often tardy, are going to have a tougher time getting away with it, if John Weidenhammer has anything to do with it. Weidenhammer Systems Corporation has recently developed *On-Line Student Attendance*, a *dBASE II* program that is designed to keep

track of chronically absent students.

The program, written by Gary Shipe, brings up the names of students, sorted by homeroom, on the left side of the screen and indicates on the right side whether they are absent or tardy, and the type of absence (for instance, in Pennsylvania, absences can be either lawful or unlawful). School staff members can then use it to produce end-of-the-week and end-of-the-year reports and to track absence patterns for each child.

Weidenhammer decided on *dBASE II* for his new program because he wanted to use a popular database manager with an inexpensive runtime system. He hoped to sell his new program to other schools.

Dr. Robert Witten of the Upper Adam School District in Pennsylvania has been using *On-Line Student Attendance* since the beginning of the school term, and so far, the program has been a success. "Each administrative office in the district has an IBM PC. We've networked a hard-cable line to the largest elementary and high schools on our campus, and we've also got hard lines in our general offices over to our System 34 computer."

Witten is hoping to expand Upper Adam District's use of the program. "We're looking at transportation, for example, so we will know what time our children are picked up and left off, and which buses they ride."

Shave and a Haircut

"I think it offers a lot of potential for fun," said Bruce Everling, talking about his *dBASE II* program, *Hair Stylist Management*. "If a hair stylist walks over to the computer setup at the checkout stand and enters information about the job he has just done, a bill could be generated and paid and the statistics entered automatically. This way the customer and management can pass notes back and forth."

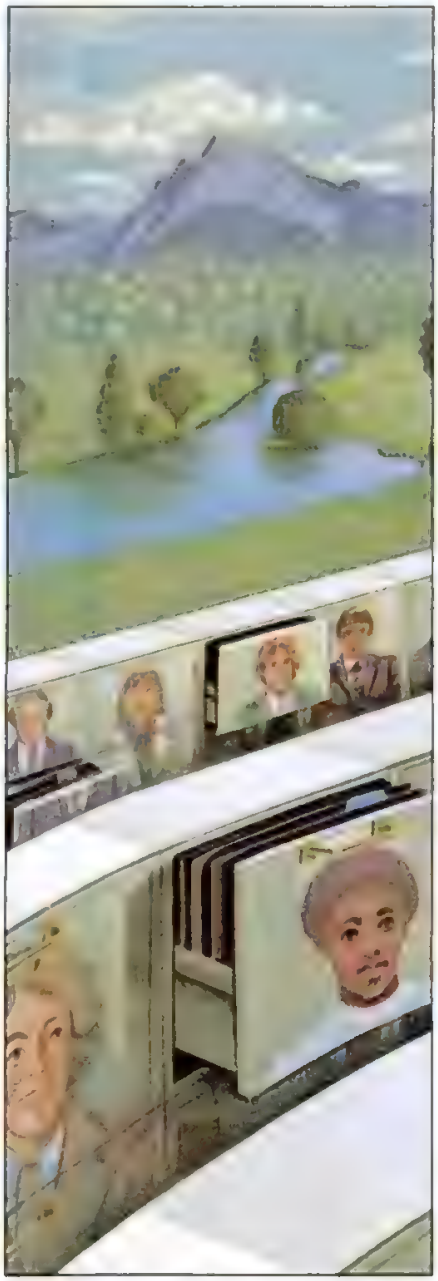
The statistics that can be entered into the program include the number of haircuts, permanents, colors, and dye jobs per stylist, and the total number of products sold. The system also maintains a general accounting record from month to month and generates end-of-year statements.

Everling originally created the program for Joan Berkowitz, the computer-shy owner of Bananas, Inc., a beauty shop in College Park, Maryland. Early last year, Berkowitz purchased a computer to help run her business and found herself unable to use it. "I was unwilling to read the 2-inch thick manual and find out how to use the darn thing," she admitted. So, she collaborated with Everling on *Hair Stylist Management*.

"When I found Joan, the computer was sitting on her desk, and the first time I said, 'Here's something to try,' she was very reluctant to touch the keyboard," said Everling. "But after two or three visits, she was having a wonderful time."

The Candidate

Anyone who has followed a major political campaign must have wondered how candidates keep track of everything happening around them. It isn't easy, according to Florida resident Van Jones, who worked for 10 years on the campaigns of Richard Stone, the former senator and present ambassador at large to Central America. "I realized 8 or 9 years ago that there was obviously a better way to do this," said Jones. "We could not put



Harness Race Horse Handicap should help gamblers lose their money with a little more assurance.

it together for mainframes because they were just too cumbersome. So when micros became popular, the idea resurfaced." After consulting with computer professionals, Jones settled on an IBM PC and *dBASE II* as the ideal combination for his new program, *dCamp*.

The program has three modules. "Finance" tracks contributors and expenditures and produces reports for disclosure, which are legally required in Florida. "Organizer" keeps track of volunteers. "For example," Jones explained, "In a rural area you might have a big sign campaign, and you want a crew to go out on Tuesday morning to put signs in people's yards. Using this system, you would be able to easily find out who's signed up for Tuesday mornings."

Finally, using "Schedule," a campaign manager could input invitations to events as they come in and code them for such factors as expected crowd size, media coverage, and fundraising. The program will then produce a priority order that helps the candidate to decide which events to attend.

"It's not very scientific," Jones admitted. "But if it rates an event as number 100, which is the highest it will go, you probably ought to look at that. But if it comes out with a .003, maybe you should put that event on the back burner."

At the Races

"I used to be second driver for one of the best harness race drivers in the country," boasted Ramon Piñon. To prove it, he has created *Harness Race Horse Handicap*, a *dBASE II* application that should help anxious gamblers lose their money with a little more assurance.

The program first inputs all the information that a horse-racing devotee needs in order to come up with a probable winner. This includes track conditions; the horses' records calculated in minutes, seconds, and fifths of seconds; the horses' last drivers and positions; and the drivers and their positions during the current race. After digesting all available data about horses, drivers, and tracks, the program will predict the order in which the ten horses will finish a particular race.

Piñon, who has been running his program since January 1983, asserts that a horse predicted by the program to win will not come in any later than third place. He has also fashioned the program so that anyone familiar with *dBASE II* could easily modify it to suit his needs.

As a measure of his program's accuracy, Piñon and his wife tried it and successfully chose winners in eight out of nine races.

"The only problem," he concluded, "is that the horses the computer picked turned out to be favorites. And we didn't make much money—we only bet $2."

Tracking Down Infection

When patients are admitted to a hospital," Richard Coscia explained, "they stand anywhere from a 5 to 10 percent chance of getting an infection. So it is important to track down any kind of infection as soon as it occurs, locate the source, and stop it."

Coscia, the Infection Control Coordinator for McLaren Hospital in Flint, Michigan, is also one of the original users of *dBASE II*. "I'm a hacker," he admitted happily. So it is not surprising that he was able to develop a *dBASE II* software package to help him track down hospital infections. The program begins by looking at various clinical parameters, such as temperature elevations, antibiotics used, and high-risk equipment. It then determines if there is a chance that a patient has developed an infection while in the hospital, compiles data on various infections that do occur, and tracks the use of antibiotics. "The staff found that they were able to cut antibiotic use in the hospital by 60 percent," Coscia said. "It has resulted in about $150,000 a year in savings.

"We have two other hospitals in the city that are looking to get onto the system; they just have to purchase equipment. We're going to try to hook up a network. Often some patient cared for here would

go to another hospital, and the infection would show up there."

Coscia is not content to rest on his laurels. He is presently working on a *dBASE II* program called *Q&A* to help electrical manufacturers' reps keep track of their financial dealings. "They had a program written in BASIC but it was so slow and cumbersome," he explained. "So I'm writing it in *dBASE II*."

Par for the Course

Like many golfers, Rick Guerrero can't resist a challenge. "I got roped into being handicap chairman, which is a privilege nobody wants. At that time, one of my best friends was heavily into organizing a tournament. I had gotten into computers, and I learned *dBASE II*, so I said, 'Heck, I can do that—watch this!' "

But after about 500 hours, Guerrero had created the first version of *Golf Tournament Scoring*, which, in its present form, can calculate golf tournament scores 16 different ways. Competition officials can use the program to keep track of each golfer's low gross (raw score), low net (the score less the golfer's handicap), the established handicap basis, the jackpot competition (winners of the first and last nine holes), and the flight (proficiency grouping).

"When the guys come in off the golf course," Guerrero explained, "they have to wait maybe an hour or two until they find out the results. What we do is run the scores as they're reported, so people can see where they stand, how they've shifted from second to first place, back to third, and so forth. It's a continual thing."

The program is a natural for fundraising competitions, he said. "They pay their entry fee and also pay, say, another $25 per person, which entitles them to enter the competition in five different categories. The fundraiser takes $10, and $15 goes toward the awarding of prizes."

The program has encouraged some unofficial financial dealings, as well. "A lot of side betting occurs. Golfers say, 'What are you going to bet if I stay in second place? Golfers will bet on anything—they're crazy people."

High-Tech Religion

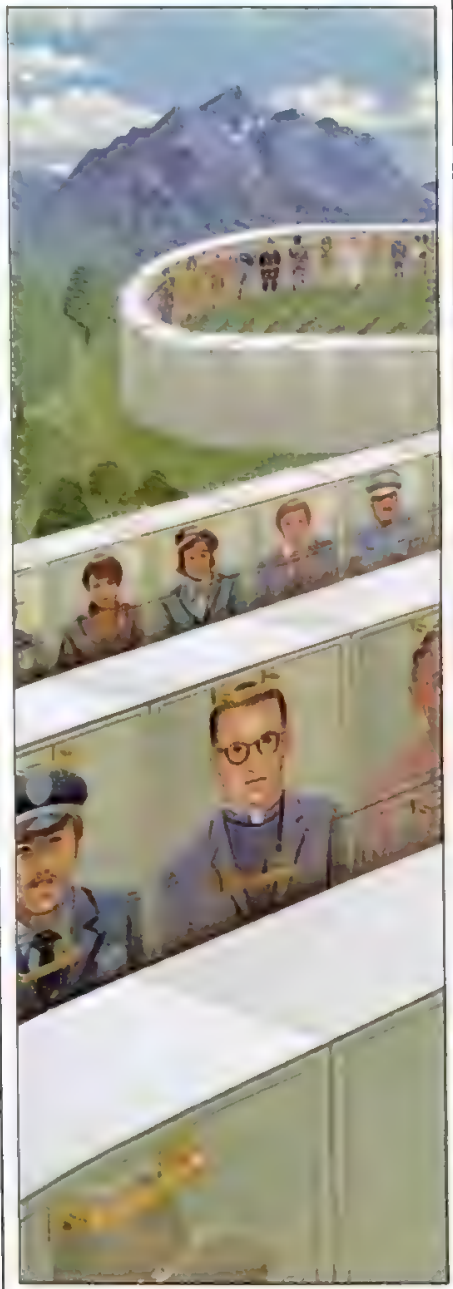
What can computers do for the church? This was the subject of a 3-day national ecumenical conference in Pittsburgh about a year and a half ago, and programmer Tom K. Hamilton was there. "I volunteered to write a database that any church could use and to make it available at no cost," he said. "People looked at it and liked it. They said, 'Now let's have the program'."

The result was *Church Membership and Finance*, a *dBASE II* program that fills many church administrative needs. It serves two purposes: keeping track of information concerning parishioners and storing the church's financial data. It does not do general-ledger work, but will interface with a separate general-ledger program that Hamilton has produced. In order to keep the system open-ended, Hamilton uses three files. One carries data about the parishioners, a master file contains categories by which they can be tracked, and a third file acts as a pointer between the other two.

"I've been doing programming for about 25 years now," said Hamilton, who has been active in his own Trinity Methodist Church. "I wanted a language that was completely transportable among all the different machines. I haven't found any language that really is, besides *dBASE II*."

So far the program is being used on a test basis at three Ohio churches and is being prepared for use in three others. However, it is not being used at Trinity Methodist Church, where after a year and a half the church still hasn't decided what type of hardware to purchase to go with its member's new software. How does Hamilton feel about that? He smiled and admitted, "It's very embarrassing." ■

Barbara Krasnoff is a freelance writer and the author of Robots: Reel to Real, *a novice's guidebook to robotics, published by Arco Publishing, Inc.*



The program looks at such parameters as temperature elevation, antibiotics used, and high risk equipment.

A New Breed Of Applications

Although many users originally bought dBASE II as a database management system, some programmers are using its built-in language to develop all kinds of applications programs.

As the costs of software development and marketing continue to rise, it will become nearly impossible for small firms to profitably introduce general, or horizontal, application programs such as Ashton-Tate's *dBASE II*. Today, a Wayne Ratliff in his den, or a George Tate in his garage, would be hard-pressed to compete against such general applications programs, even if they had the best of products. However, the potential for developing specific, or vertical, software applications, is nearly unlimited. This area is likely to remain both one of the fastest growing segments of the computer software market and the refuge of many of the smaller firms.

Room for Growth

Although *dBASE II* is a general database management system, many users who bought it for this purpose wound up using its built-in applications development language (ADL) to write their own, smaller, specific programs. These programmers often chose the powerful and flexible *dBASE II* instead of BASIC, which can be too slow and cumbersome to use. *dBase II* is block-structured and procedural and can handle—at least in theory—up to 65,000 records. The language provides programmmers an environment with room for growth.

Most people who have heard about the flexibility and power of *dBASE II* can't or won't take the time to master an entirely new language. However, a small army of old programming hands are using *dBASE II* as a language to write a wide variety of applications. These new "dPeople" are now emerging to sell the fruits of their specialized labors as both commercial and nonprofit products.

With well over 100,000 legitimate *dBASE II* users and, no doubt, an equal number of freeloaders, even Ashton-Tate doesn't know how many commercial or general-interest *dBASE II* applications exist. There must be thousands of organizations and individuals who have developed a *dBASE II* program or database that would be useful to someone else. Ashton-Tate, is however, aware of many of the applications that developers have written. The company has a catalog called *Application Junction*. A quick glance at it reveals a wealth of *dBASE II* programming endeavors. (See the accompanying sidebar, "All Aboard at Application Junction.") At last count, the catalog included more than 700 programs, and the number is climbing fast.

What follows are two reviews of specific software applications written in *dBASE II*. The first, *The Champion* is a compact business accounting system. The second, *dNAMES* is a low-cost, full-featured mailing list program. Both are now commercially available.

Photograph: Ed Gallucci

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The Mighty Champion

The Champion
Champion Software Corporation
66 South Van Gordon #155
Lakewood, CO 80228
(303) 987-2588
Price: $595 per module; $2,995 for full system.
Requires: 64K RAM, two disk drives.

CIRCLE 685 ON READER SERVICE CARD

Visitors to the Ashton-Tate booth at the 1983 Comdex spring computer show in Atlanta could hardly fail to notice the large exhibit area next to it advertising "complete accounting on just one disk." It was one of the first public demonstrations of *The Champion*, which, within a few months, became a very popular general accounting package.

Its developer, Champion Software Company (formerly Data Base Software Corp.), had previously worked with minicomputers and at first was highly skeptical when customers asked it to create a full-featured on-line accounting system for micros. Then the company discovered *dBASE II* and wrote a best-selling Run-Time application.

The program comes in five modules, one each for general ledger, accounts receivable, accounts payable, inventory, and payroll. *The Champion* uses *dBASE II* facilities, such as full-screen editing and the ability to update multiple files immediately, to good advantage. Its manufacturer claims that up-to-the minute financial statements can be generated at any time. Since *The Champion* was designed by a certified public accountant, it provides excellent audit trails. *The Champion* also allows for such *dBASE II* features as on-screen and hard-copy reports, as well as user-defined reports.

Particularly impressive are the numerous on-screen Help functions, which provide hints and examples for using various features of the software, and the recovery

All Aboard at Application Junction

A sampling of Ashton-Tate's catalog of over 700 application programs.

Since 1982, Ashton-Tate has provided listings of application programs written in *dBASE II*, which developers are making available in the marketplace. The programs generally have not been tested by Ashton-Tate, but the *Application Junction* catalog provides a good starting point in any search for software making use of *dBASE II*. Here are some of the current categories and sample features of available programs.

Engineering Services: Document control; architectural planning.

Financial Services: Employee savings account maintenance; tracking fringe benefits; materials and labor pricing for the fence industry; fixed-asset accounting; IRA account purchases; musician's union payroll, herdsman's dairy management; local government accounts payable; time card analysis; temporary secretarial payroll; stud-farm management; multi-currency accounting in Hebrew.

Insurance Applications: Insurance accounting; benefit analysis; form letters.

Inventory Services: Floor-plan system for appliance dealers; bank night-deposit bag rental and billing; sports betting; grain banks.

Legal Applications: Document retrieval and litigation support; time billing.

Leisure Services: Convention management; tournament golf scoring; hotel reservation and billing systems.

Mail List Management: Sales prospecting; labels; catalogs; political campaign management.

Medical and Dental Services: Personnel dosimetry records; biomedical engineering; medical office records and billing; charitable donation records; veterinary, dental, and nursing management; pharmacy prescription maintenance; toxicology analysis; chiropractice management; anesthesia accounting.

Membership Organization Management: Country club dues accounting; church management; fraternal society mailing lists.

Miscellaneous Applications: Security and parking control systems; wine pricing and cellar management; local government board minutes index; music playlist for radio stations; census data.

Property Management and Construction: Estimating; job costing, and accounting for contractors; real estate brokerage; condominium time share marketing; mobile home park and pavement management.

Publication and Subscription Management: Subscription fulfillment; bibliographic and note-taking utilities; circulation control; library automation; bingo card maintenance.

Sales Management: Vending machine operations; retail inventory; traffic control signs; nutritional analysis; liquor store management; rare book cataloging; salesperson commissions.

Utilities: File encryption; trigonometric functions; file recovery. —D.L.

Application Junction
Ashton-Tate
10150 West Jefferson Blvd.
Culver City, CA 80230
(213) 204-5570
List Price: $19.95

CIRCLE 683 ON READER SERVICE CARD

program, designed to bring the books back into balance after a serious system crash. But most amazing of all is the compactness of the program. The five major modules all fit on a single 5¼-inch floppy disk.

A Pioneer Mailing List

dNames
Data Based Solutions
1975 Fifth Ave., #105
San Diego, CA 92101
(800) 336-6060
List Price: $129, plus $5 shipping and handling.
Requires: 64K RAM, two disk drives.

CIRCLE 684 ON READER SERVICE CARD

dBASE II purchasers accustomed to simpler filing systems are often startled to find that setting up an ordinary mailing list is not a preprogrammed function available on command. Though the latest versions of *dBASE II* include sample mailing list programs for producing from one to four labels, until recently, *dBASE II* users who wanted a full-featured one at low cost had few places to turn. Fortunately, the program *dNAMES* provided what many people needed.

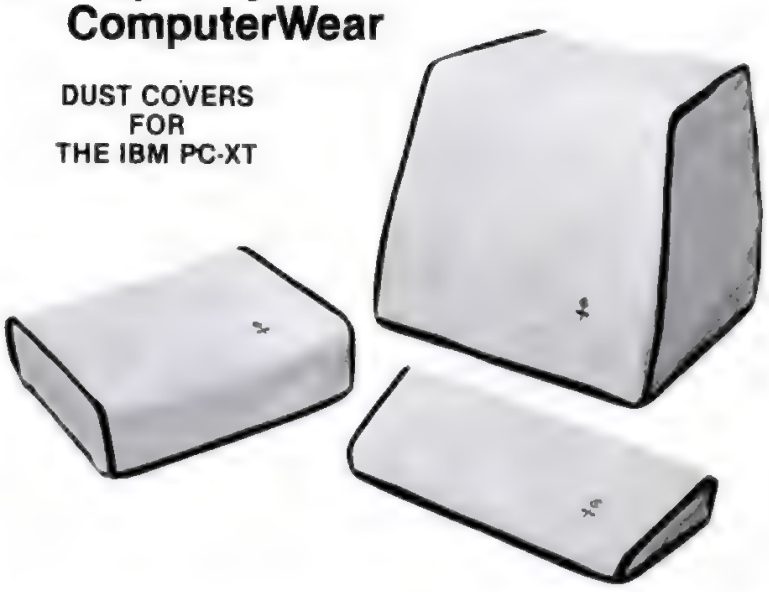
dNAMES, like most *dBASE II* application programs, is totally menu-driven, eliminating the dot prompt. It provides a strong measure of error-checking and is highly modular, thereby (like *Friday!*) occupying many disk directory entries and sacrificing some speed in execution. Each record in a *dNAMES* file can be selected by up to six categories and chosen from among 40 possible classifications. There are several built-in report and label formats and provisions for preventing the entry of duplicate records and for transferring outdated records to a backup disk. The actual *dBASE II* source code is available, so minor modifications to the program are easy to make. Thanks in part to their success with *dNAMES*, Data Based Solutions, the developers of the program, are now a miniconglomerate. ■

Don Layman currently heads Polygon Systems, Inc., a systems house and consulting firm, in Alexandria, Virginia.

He is codeveloper of the Publiphile subscription management system for publishers and several other commercial and nonprofit dBASE II *applications.*

Contemporary ComputerWear

DUST COVERS FOR THE IBM PC-XT



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CIRCLE 196 ON READER SERVICE CARD

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Ronald Eldredge
Lockhart Financial Services

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Three Easy Add-Ons For dBASE II

If you like working from menus and don't want to write your own code, these dBASE II aids are for you. You pay a price, however, in lost speed and reduced operating power.

Many products in the computer world exist purely because there is some greater "host" that was created before them. In the world of hardware, the enhancement boards and other devices that can be plugged straight into the IBM PC to extend its power and flexibility are a multimillion-dollar case in point. The add-on "boosters" and "friendly" interfaces for Ashton-Tate's *dBASE II* are comparable examples of add-ons from the world of software. Rather than extend the program's power, they make it more accessible or easier to use.

Three program generators are among the *dBASE II* add-ons now on the market: *Autocode 1*, *QUICKCODE*, and *dBASE WINDOW*. Each represents three separation levels of sophistication. Buying a program generator typically means buying a software package that will write a sizable chunk of code. All you have to do is design your screen layout and respond to menu options. But there are differences among programs that are worth considering before you make any investments in a

Autocode 1
Axel Johnson Corporation
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List Price: $195
Requires: 64K RAM, one disk drive, 130K disk storage.

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dBASE WINDOW
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dBASE II program generator.

General Considerations

To start with, if *dBASE II* appears too powerful or complicated for you or your application, you might be better off buying one of the inexpensive, menu-driven, database systems like *pfs:FILE*, offered by Software Publishing Corporation of Mountain View, California, or even Ashton-Tate's own *Friday!* package. Be sure you understand how powerful *dBASE II* is. Misapplied, its power can wreak widespread havoc.

No program generator will produce every line of code you need; there will always be some patching or code refinement to do if you want the best possible application. Indeed, because of the different programming philosophies followed by each software developer, there will be differences in the *dBASE II* code produced by various program generators even though they may use exactly the same screen design as a starting point. If you don't like the idea of meddling with program generator output, then you are not likely to get the most out of *dBASE II*.

One of the most powerful aspects of *dBASE II* is that it can keep track of relationships between data fields in more than one database file (a maximum of two files being open at any one time). The simpler program generators such as *Autocode 1* and *QUICKCODE*, do not automatically handle this kind of linking, or switching, between what in *dBASE II* are called *primary* and *secondary* database files.

Finally, program generators offer help to users only at the cost of reduced processing speed. Although program generators produce reliably standard *dBASE II* code, they are not necessarily designed to produce compact and hence speedy code. Nor do they incorporate programming tricks to avoid certain *dBASE II* peculiarities. They cannot automatically include machine language routines. Although you can sometimes speed up systems created with program generators by carefully merging modules to reduce the time spent going to and from main memory and the disks, this and other refinements are the province of the experienced programmer. For the less-experienced programmer, the first task is to discover what *Autocode 1*, *QUICKCODE*, and *dBASE WINDOW* can do.

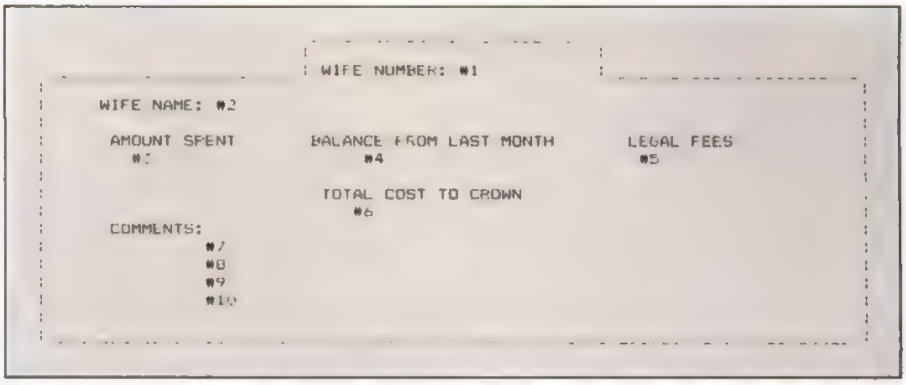

Figure 1: *Data entry screen layout for* Autocode 1 *with fields numbered 1 through 10.*

Autocode 1: Fit for a King

Autocode 1, developed by a London-based company called Stemmos, Ltd., can generate a large amount of code in a relatively short time for straightforward tasks. It presents users with simple menus to set up basic reports.

As with all *dBASE II* code generators, you must first give *Autocode 1* a screen format to work with. Our sample format is supposed to look like a file card, the kind you might set up for keeping track of your contract details (see Figure 1). In this case, however, the database deals with the six wives of Henry VIII.

With *dBASE II* your data entry screens are assigned a key field, a unique identifier that appears only once per database (in our example, the WIFE NUMBER). The paunchy English monarch married six specific wives in a specific order; WIFE NUMBER preserves the unique identity of each wife and the order of her marriage to the king. WIFE NAME would do this too, but less conveniently for the user: It's easier to recall or search for six numbers than for six different names, whose precise spellings you may have forgotten. Was it Ann Bolyn or Anne Boleyn?

Common examples of key fields are employee number, policy number, part number, and invoice number. Fields can be used in conjunction with each other for more precise record searching. For example, you might choose to obtain retirement data for employees with certain employee numbers. By searching the database in two fields—employee number and zip code—you could obtain the information for the targeted employees and arrange it by zip code area.

In our hypothetical example, I used the *dBASE II* MODIFY COMMAND feature to create a file called HENRY1.SCR (the .SCR extension identifies the file as a screen definition file).

Figure 1 presents the type of screen layout and the field formats that *Autocode 1* requires if it is to generate functional *dBASE II* code. The Xs denote character fields; the 9s denote numeric fields, and 9s followed by a question mark represent a field whose value varies according to a given formula, in much the same way as the value of a cell in a spreadsheet like *VisiCalc* can be mathematically dependent on the values of other cells in the spreadsheet. The ability to make field entries a function of the values in other fields is a useful feature, especially if you intend to use *dBASE II* to keep track of financial information. Such fields are called calculated fields.

You begin building a working database file once you are satisfied with the screen (.SCR) file and have saved it on disk. The

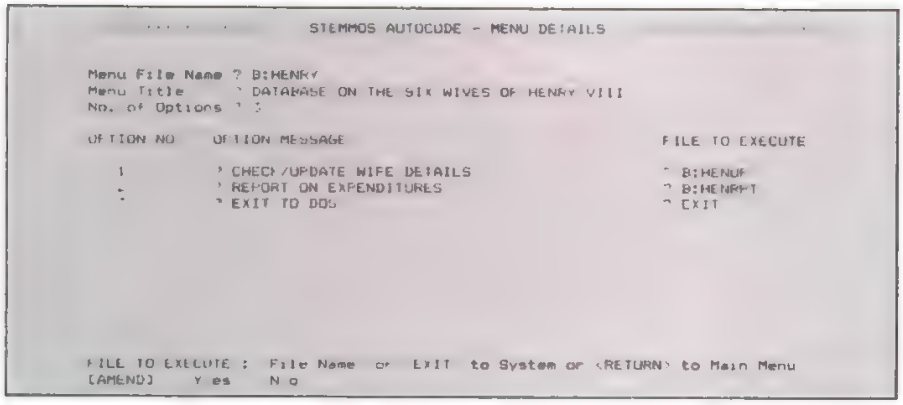

Figure 2: Autocode 1 *Menu Generation screen.*

first step is to choose the right menu option.

Four Options

Four options display when the program is loaded: Menu Generation, File Maintenance Generation, Report Generation, and Exit.

The Menu Generation screen permits you to enter the name you wish to give to your menu file, that is, the filename you will ask *dBASE II* to DO when you have finished building your system. The Menu Generation screen for our example and the filename B:HENRY are shown in Figure 2, where the B represents the name of the disk drive to which the file will ultimately be saved, an essential item of information for *Autocode 1*. The screen also presents you with an AMEND option to change your entries, but *Autocode 1* has no way of forcing you to enter the right filenames—you will discover errors only when you run your finished system and *dBASE II* begins to object.

There are several other parts to the Menu Generation screen, including two reserved words, EXIT and RETURN. EXIT allows you to exit from the *dBASE II* environment altogether; RETURN restores the main menu so you can pursue other work. Finally, in our example, the filename is B:HENUP for the search and update feature. For the report feature the filename is B:HENRPT. Very little time is required to fill in the Menu Generation screen, unless of course you dawdle over the aesthetic decisions necessary to make the screen look acceptable.

The File Maintenance Generation option establishes the principal parameters for the various fields of the database so that invalid data are not entered later on and so that data are not improperly manipulated. The option has three main parts: You tell *Autocode 1* which fields in your .SCR file are the key fields, what the valid entries are for each field on the screen, and what the formulas are that produce the data in calculated fields.

The first screen asks you to indicate which fields will be used as keys and to assign a priority from 1 to 7 to each. Only text fields defined by X's can be keyed, although such fields may contain numeric data.

A subsequent screen asks you to enter the formulas for the calculated fields. The Henry VIII screen file (see Figure 1) contains one calculated field, TOTAL COST TO THE CROWN. This figure represents the cost to Henry of keeping the wife whose record is currently on-screen. The field value is determined by summing AMOUNT SPENT, LEGAL FEES, BALANCE FROM LAST MONTH, and an interest charge of 10 percent on the unpaid balance. Expressed in terms of the field numbers in Figure 1, the formula is:

```
#3 + #5 + (#4 * 1.10)
```

This is typical of the kinds of formulas that you are allowed to use in producing calculated fields.

To complete the File Maintenance Generation option, you set up the range checks for record fields by deciding what data the user can enter at specified locations on the screenfile and what data can be sensibly rejected by the program. A range check for B:HENRY, for example, would prevent a user from trying to enter in the WIFE NUMBER field either a number higher than 6 or non-numeric data.

Likewise, a range check would prevent someone from entering numeric information in the WIFE NAME field, which would corrupt the database. If we so desire, character fields can also be validated because letters of the alphabet are ranked in an ascending order from *a* to *z*—*a* is treated as if it had a value of 1 and *z* is treated as if it had a value of 26.

For Report Generation in straight *dBASE II*, you set up a report file by telling the system the name of the report form, the kind of formatting you want (enter headings if you need them), whether or not there are totals and subtotals of numeric fields (supply the necessary data), and, most important, the field name that contains the data to be output and its character width.

A range check would prevent someone from entering numeric information in the WIFE NAME field.

The *dBASE II* method for creating a form (.FRM) file is easy to complete, if a bit messy. *Autocode 1* adds nothing to the operation except a data entry format that is determined to keep you on the right track and that allows you to amend the last completed report field or to restart the whole thing if you've really made a mess of it. The two screen formats for the Report

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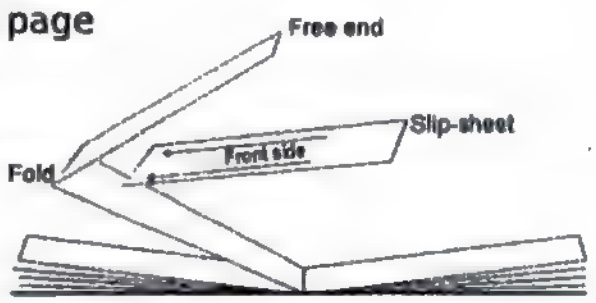

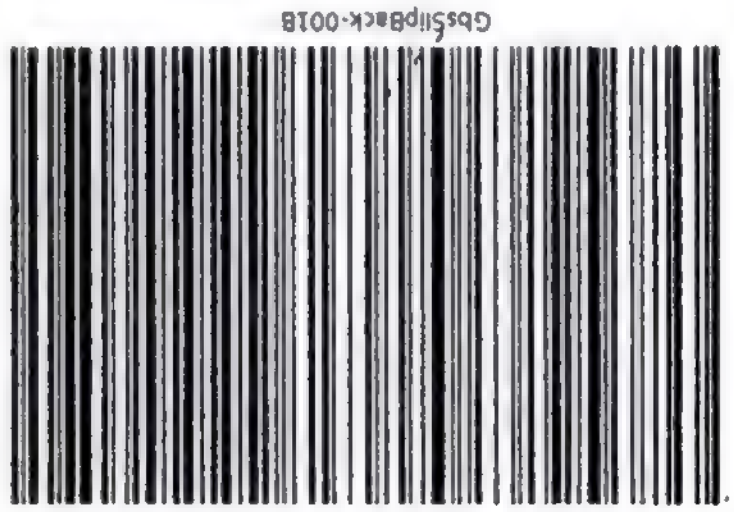

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Generation option appear in Figures 3 and 4 with various parameters filled in. These two screens contain the formatting information for the "Monthly Expenditure Report" shown in Figure 5. Once you reach this point, you're essentially finished with *Autocode 1*. You now have a set of database files (about 13K in this case,) including the programs that should, if you've done everything correctly, run the first time you enter DO HENRY.

```
<<<<<<<<<<<<<<<<<<<  REPORT OPTIONS : GENERAL SPECS   >>>>>>>>>>>>>>>>>>>

REPORT FILE PRIMARY NAME ? B:BILLS

L/MARGIN 1     LINES/PAGE 25    PAGE WIDTH 75     PAGE HEADING REQ.(Y/N) Y

PAGE HEADING ? MONTHLY EXPENDITURE REPORT FOR DECEMBER

DOUBLE SPACING (Y/N) Y

DO YOU REQUIRE TOTALS (Y/N) Y

ARE THERE SUBTOTALS (Y/N) N        ENTER SUBTOTAL FIELD

DO YOU REQUIRE A SUMMARY REPORT ONLY (Y/N)

NEW PAGE AFTER SUBTOTALS (Y/N)

ENTER SUBTOTAL HEADING

NO OF REPORT HEADING FIELDS ? 4

[Choice]  <A>=Amend  <R>=Restart  <RETURN>=Continue
```

Figure 3: *The .FRM screen from* Autocode 1*'s Report Generation option.*

```
<<<<<<<<<<<<<<<<<<<<<<<<   REPORT FIELD SPECS INPUT   >>>>>>>>>>>>>>>>>>>>>>>>

   NO.   COL. HEAD         COL.WIDTH    COL. CONTENT
   ===   =========         =========    ============

   (1)   NAME              20           #2
   (2)   NUMBER            8            #1
   (3)   TOTAL EXPENSES    20           #3+#5+(#4*1.10)
   (4)   LEGAL FEE AMT.    20           #5

[CHOICE]   <R>estart   <A>mend   <RETURN> to Continue
[NOTE] If Col. Content is calculated then input Formula of Calculation
Are Totals required (Y/N) ? Y
```

Figure 4: *The Report Field Specification screen from* Autocode 1*'s Report Generation option.*

```
PAGE NO. 00001
01/01/80

                    MONTHLY EXPENDITURE REPORT

NAME                NUMBER  TOTAL EXPENSES      LEGAL FEE AMT.
====                ======  ==============      ==============

CATHERINE OF ARAGON 1       2593.62             1800.00

ANNE BOLEYN         2       3627.40             1500.00

JANE SEYMOUR        3       42.01               0.00

ANNE OF CLEVES      4       2500.00             2500.00

CATHERINE HOWARD    5       1829.00             600.00

CATHERINE PARR      6       184.00              0.00
```

Figure 5: *Output from* dBASE II *Report Writer set up by* Autocode 1.

QUICKCODE Has Graphics

To relieve the tedious code-writing process of *dBASE II*, Fox & Geller of Elmwood Park, New Jersey, introduced *QUICKSCREEN*, a program generator that, by means of text-editing commands, could produce all the necessary I/O routines for inclusion in more complex programs. Ashton-Tate's decision to provide a comparable screen editor, *ZIP*, as part of *dBASE II* then forced Fox & Geller to develop *QUICKCODE*, an efficient *dBASE II* program generator that uses *QUICKSCREEN* as its screen editor.

The user interface of the latest version of *QUICKCODE* (version 2.2) makes use of IBM PC graphics characters to place borders around the main menu selections, and a lot of the distracting information that cluttered up earlier versions has been banished to subscreens. Version 2.2 seems to have no major flaws in its design. Indeed, from the user's point of view, the *QUICKSCREEN* editor's ability to generate IBM graphics characters in *dBASE II* .SCR files extends the possibilities for good—and bad—data entry screen design. Compare Figures 6 and 7 to see the changes in the main menu. I created an .SCR file by entering the *dBASE II* MODIFY COMMAND editor and using graphics to make the well-defined card file outline shown in Figure 8. I found the right graphic character for producing the smooth outline of the card from a sketch provided by Fox & Geller, but customers of the commercial product will be provided with a keyboard template as a reference tool.

QUICKCODE gives you far more control than *Autocode 1* over the kind of files it can generate and the content of those files. You can initiate any *QUICKCODE* file type simply by creating a valid .SCR file in *QUICKSCREEN* mode and then pressing the Esc key. Or you can return to

the main menu from *QUICKSCREEN* mode and select a few file types to create. Or you can just save the .SCR file to disk and figure everything out later.

This kind of selectivity is of great importance to the targeted users of *QUICKCODE:* programmers and consultants who are generally under pressure to create large database systems, or the enthusiastic database user who doesn't want or have time to learn programming. It also comes in handy when you want to duplicate a file currently in use, modify it in some way, and then replace the original with the new version.

A third advantage of *QUICKCODE* is that, in accordance with the basic tenets of structured programming, it produces a separate file for all the important database functions. Do you wish to enter information to format printed forms? Do you want to add new records to your database? Perhaps you wish to retrieve data in a form that can be used with *WordStar* and *MailMerge*. A separate file is reserved for each function.

Each separate program module is produced in a consistent fashion. For instance, *QUICKCODE* uses the same variable names throughout, and the key sections of each program are provided with comment statements.

QUICKCODE requires a totally different kind of field description compared to *Autocode 1*. Instead of using X, 9, and 9? for defining field types, *QUICKCODE* requires that fields be given a name preceded by a semicolon (;). The field type is ordinarily set by the last character of the field name: no special character (;name) indicates that the field is a character field; a dollar sign indicates a "money" field (;money$); and the number sign indicates that the field type is integer (;total#).

Although these are the only field types possible when you are working in *QUICKSCREEN*, Fox & Geller has made it possible for other field types to be added by providing a special fields mode. With this facility, numeric (9999999999.9), date (mm/dd/yy), telephone (999–999–9999), and social security number (999–99–9999) fields can be set up.

The field lengths in *Autocode 1* are established, up to prescribed *dBASE II* limits, by the number of X marks or other defining symbols you enter in each field in the .SCR file.

QUICKCODE, on the other hand, adopts the "I'll default to specific values unless you tell me otherwise" approach. Error messages are displayed if default values cause fields to collide, but the best approach is to be explicit.

As a default, Fox & Geller uses the greater-than sign (>) as the explicit field length marker. If you wish to change this, any other reasonable symbol (that is, one that does not conflict with other system defaults and so forth) can be substituted as an end-of-field marker by selecting the S

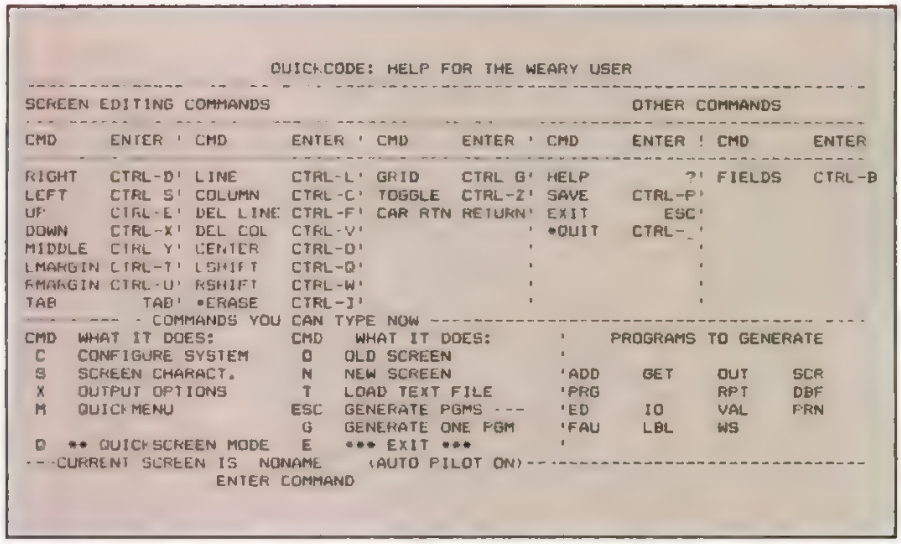

Figure 6: *Cluttered main menu from previous version of* QUICKCODE.

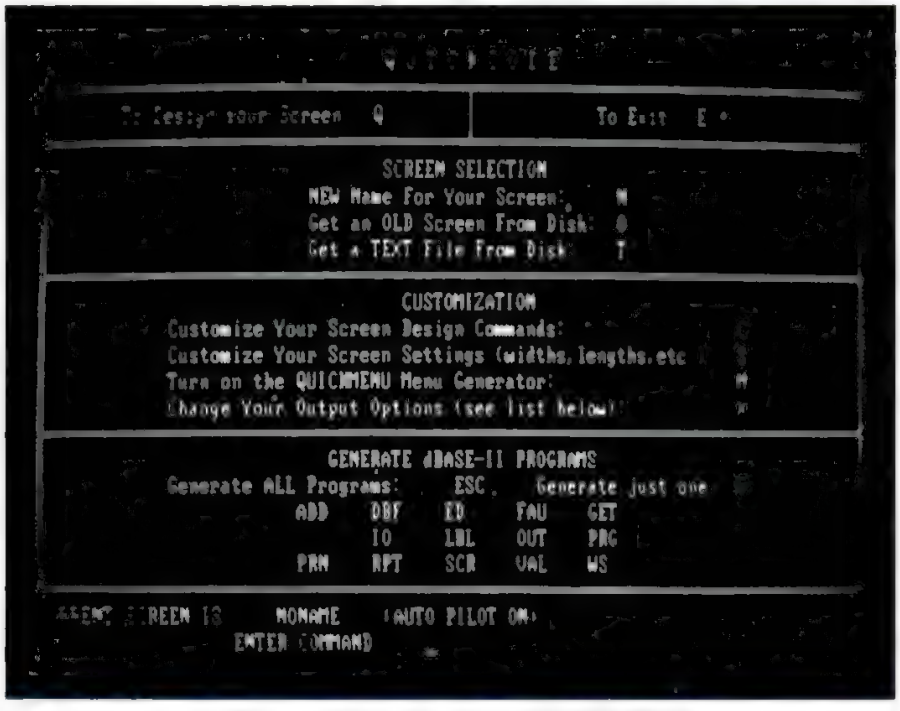

Figure 7: *Improved main menu from current version of* QUICKCODE.

command from the main menu.

Autocode 1 and *QUICKCODE*, which offer no lasting relief from the *dBASE II* dot prompt, are the equivalent of bringing in a team of contract programmers to create all the programs you need. Once these products have generated enough *dBASE II* code, they can be consigned to the disk library until the next project. Using *dBASE WINDOW*, on the other hand, is rather more like starting up your own in-house programming department.

dBASE WINDOW differs dramatically from its competition in a number of ways: As a front-end program, it provides the user with menus and tailored screen formats that are used to create and to operate *dBASE II* systems; by allowing links (relationships) to be made between database files, it gives users access to the true relational abilities of *dBASE II;* and, finally, it requires a lot of disk space and operates very slowly.

Developed by Tylog Systems of Miami, Florida, *dBASE WINDOW* is intended for people who know how to use a personal computer but who may not know anything about *dBASE II*. In my opinion, you are better off knowing something about *dBASE II*, but I agree that anyone who perseveres will be able to produce useful database systems.

A sample *dBASE WINDOW* screen, supplied by Tylog, is shown in Figure 9. Although the field classification and database definition schemes are different from those used by *Autocode 1* and *QUICKCODE*, the screen format (located at the bottom of the figure) is quite similar.

The lines that begin with an asterisk (*) are comments, ignored by *dBASE WINDOW* and on screen solely for the user's convenience. The rest of the lines tell the system about the type of screen file and database it is expected to create. Near the top of the screen are four lines preceded by the FIELDS statement; this section identifies each field so that it can be referred to by name in *dBASE II* programs.

The next two lines tell the system to place all files that are generated on a particular drive (DRIVE B) and to create a database (CREATE CUSTOMER RECORDS).

Since we want the database to be indexed, we must tell the system the name of the index file (two in this case; NAME

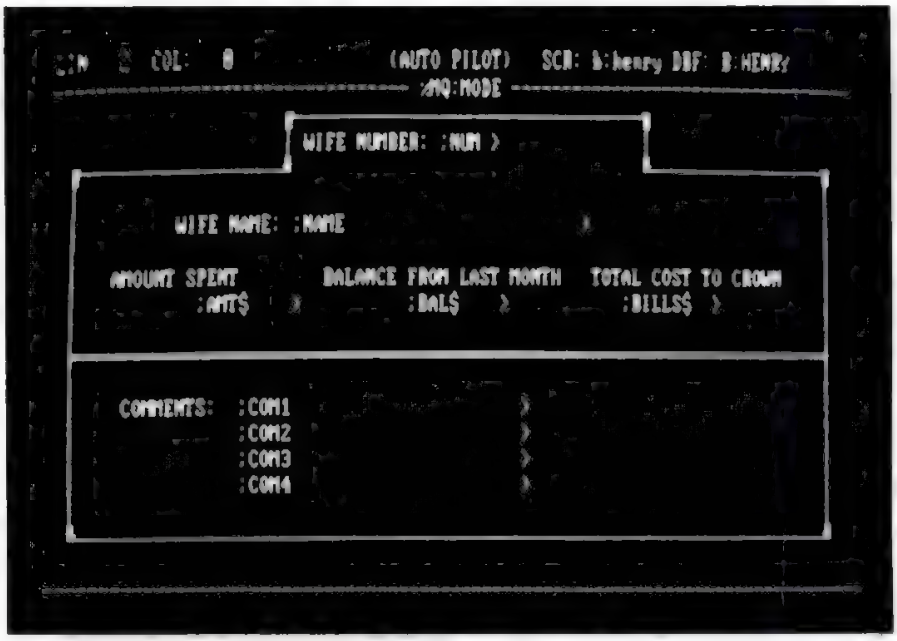

Figure 8: QUICKCODE *version of the Henry VIII card file.*

```
* Create the customer database and data screen
* for the example application
*
* Last change - 4/4/82

FIELDS FIRST:NAME | LAST:NAME
FIELDS ADDRESS
FIELDS CITY | STATE | ZIP:CODE
FIELDS AMOUNT | DISCOUNT

DRIVE B

CREATE CUSTOMER RECORDS

NAME LAST NAME
INDEX LAST:NAME + FIRST:NAME

NAME ZIP CODE
INDEX ZIP:CODE


                    CUSTOMER RECORDS

FIRST NAME :XXXXXXXXXXXXXXX:   LAST NAME :XXXXXXXXXXXXXXX:

ADDRESS :XXXXXXXXXXXXXXXXXXXXXXX:

CITY :XXXXXXXXXXXXXXX:  STATE :!!:   ZIP CODE :9999999:

AMOUNT DUE :9999999.99:   DISCOUNT :99.99:%
```

Figure 9: *Sample* dBASE WINDOW *screen showing database generation format.*

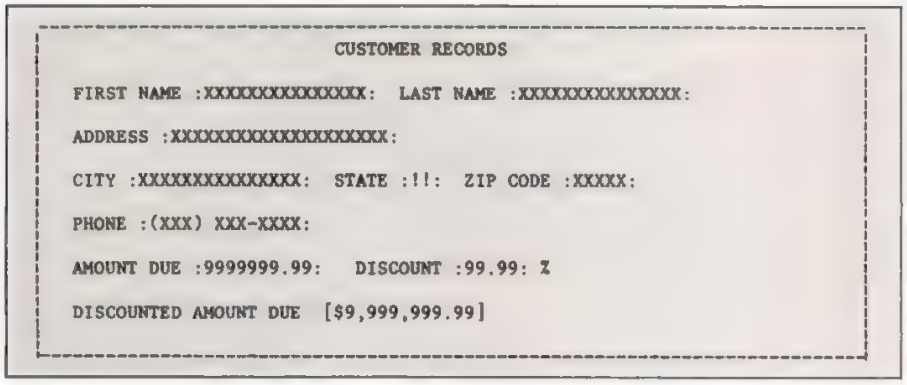

Figure 10: dBASE WINDOW *data entry screen showing an output-only field (DISCOUNTED AMOUNT DUE).*

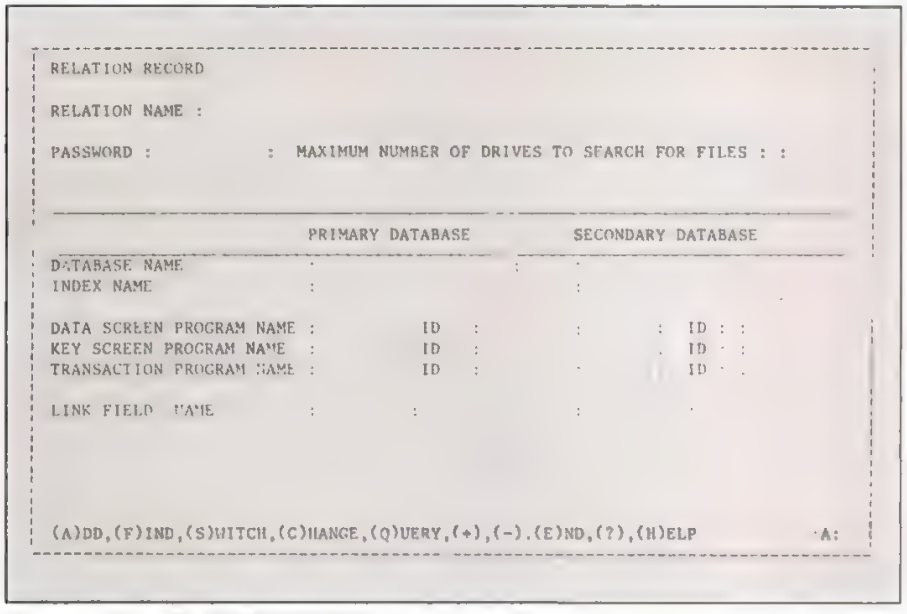

Figure 11: *The* dBASE WINDOW *Relation Record format.*

LAST NAME and NAME ZIP CODE) and the field(s) on which the database records will be indexed (INDEX LAST:NAME + FIRST:NAME and INDEX ZIP:CODE). Up to five indexes may be created per database.

Then, finally, we get to the screen format itself.

Output-Only Fields

Although it is not apparent here, *dBASE WINDOW* allows the user to include calculated fields—called "output-only" fields by Tylog—in some screen designs. It does not allow them in the screen/database generation procedure described above since they are not classified as database fields. An output-only field (DISCOUNTED AMOUNT DUE) that could be set up with the sample screen appears in Figure 10.

Much else about *dBASE WINDOW* is impressive. It has a menu option for all the tasks of setting up screen files, databases, key fields, and report generation, and for running separately written *dBASE II* command files. The report generator employs a building-block approach to database output (field description modules are moved around for the best effect), and by this means it is possible to obtain quite varied designs. There is a simple screen editor in *dBASE WINDOW* also, accessed by selecting the Modify or Create a Format main menu option.

The greatest advantage of *dBASE WINDOW* is its ability to tie two databases together. In *dBASE II* proper, switching or linking occurs between the primary database and the secondary database. To code this feature manually you enter the USE SECONDARY and USE PRIMARY commands in your programs.

To achieve the same thing with *dBASE WINDOW*, you call upon the relation catalog, which maintains a directory of all the relationships between databases that the user has set up. In the case of a system containing one database listing the holders of insurance policies and another listing the type of policies they hold, a relationship between the two databases could be created by means of the policy number. An example of *dBASE WINDOW*'s relation record screen appears in Figure 11.

Conclusion: Do You Need It?

There are differences in quality among *Autocode 1*, *QUICKCODE*, and *dBASE WINDOW*. I believe *QUICKCODE* provides better control over the performance of the end product compared to *Autocode 1*. In a situation where an off-the-shelf file-handling system has to be created within a few minutes, *QUICKCODE* requires nothing more than a user who can read the manual and follow on-screen instructions; you just "paint" the screen design, press the Esc key, and voilà—hundreds of lines of *dBASE II* code begin to stream onto your data disk. Apart from using the report generator, you don't really need to know anything but the basics of *dBASE II*.

But if you are to make full use of *QUICKCODE*'s capabilities, then it is assumed (my opinion, not Fox & Geller's) that you are experienced at translating the specifications of a particular application into *dBASE II* terms. Just as a novice accountant should not expect to know what makes a good accounting system tick, a user new to *QUICKCODE* should

not expect immediately to know how to apply the more subtle database construction techniques.

While Fox & Geller has said that it intends to add new features (such as the ability to handle calculated fields) by early next year, I feel that it is really important that the company address the demand for easier access to *dBASE II*'s relational features and develop a report writer that exceeds Ashton-Tate's offering.

Stemmos, the company that produces *Autocode 1*, has stated that it plans some significant enhancements to the product, including a screen editor along the lines of *VIP* and *QUICKSCREEN*. *Autocode 1* will come with an inquiry, or record search facility; it will be able to produce labels; and, it will have the all-important capability to link primary database files with secondary database files.

Although pleased by *dBASE WINDOW*'s wide range of features and its attempt to make everything as logical as possible, I still think it operates far too slowly to be fully appreciated by those people with floppy disk systems.

Implementing the product on an IBM XT or similar hard-disk machine could give more acceptable response times. Access to a RAM disk could prove useful, too, although I was not able to carry out any tests myself.

The *dBASE II* system works best when it is used to the fullest, something that products like *QUICKCODE*, *Autocode 1*, and even *dBASE WINDOW* don't really permit (although *dBASE WINDOW* comes closest right now). In the short term, they definitely alleviate the symptoms of "command code development shock." They help the professional programmers and consultants get through a lot of "grunt" work extremely quickly and consistently. When used wisely, they may even be a good way to introduce your organization to programming design and documentation standards.

The thought that keeps coming back to me is why pay for *dBASE II* and an add-on program (that cannot help but dilute *dBASE II*'s power), when there are many less expensive options on the market? Surely, it makes sense to match your database software to your application demands and your technical sophistication in the first place, rather than buying a very powerful system like *dBASE II* and then hiding it behind some "arm's-length" code. ■

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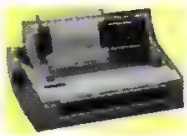

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Spending The Weekend With Friday!

Ashton-Tate's quirky program with its confusing manual has a certain elegance, but it doesn't deliver on its promise to be all things to all people.

Advertisements tout *Friday!* as a revolutionary new electronic file-handling system designed for people who know their jobs but who don't know much about computers. "So," I asked my editor after reading a *Friday!* ad, "why not have it reviewed by someone who doesn't know much about computers?"

"Great idea," my editor teased. "When can you do it?"

That wasn't exactly what I had meant, but I was backed into a corner. Anyway, I figured, it would be a breeze. "Give me the manual and I'll be back on Monday," I said, anticipating a leisurely weekend exploring *Friday!*

At home, I flipped to the first tabbed section of the manual to find out what it was all about. I learned that *Friday!* is a file-handling system suitable for the preparation of invoices, inventories, paychecks, form letters, and such. *Friday!* might be used in the home to maintain a personal phone directory or to keep track of your checking account. At work, it could help manage accounts receivable or keep an eye on warehouse inventory for any business from a mom and pop candy store to a large accounting firm. *Friday!* computes subtotals, commissions, and other math functions, and it can selectively display information according to your specifications. The introduction assured me that "*Friday!* is a revolutionary product, possessing unique features and driven by new concepts."

Friday!
Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570
List Price: $295
Requires: 128K RAM, PC-DOS, two disk drives, 80 column monitor, 80 column printer.

CIRCLE 676 ON READER SERVICE CARD

The classy-looking manual has a lip-gloss red cover that folds away from the bottom looseleaf rings to let the book support itself in a laid-back vertical position. Inside, the first few pages are equally laid-back, and a message from Ashton-Tate concludes, "Have a nice weekend!"

The "To Begin" section explains installation, backup copies, and the use of the control key. Next come some mildly confusing explanations of paper and electronic files, records, and fields. The first of the manual's six lessons gets you started. With the system diskette in drive A and the data diskette in B, a few carriage returns bring you to the main menu, where the first line lists the active file, activity, date, and a prompt number. The active file listed is titled EXAMPLES. It contains some hypothetical records created to help you learn to use the program. The prompt number refers to one of the 738 prompts that are explained in detail within the manual's "Prompt" section. The rest of the Main Menu looks like this:

```
A-Enter Data
B-Retrieve Data
C-Other Activities
D-Leave
```

and asks you what you want to do.

If you're not sure, prompt 006 will tell you a little more about each of these options. For example, "Enter B if you want to retrieve records in a specific order. You may view records on the screen in any sorted order. . . ."

The manual recommended that I simply have a look at some existing records; typing B displayed RETRIEVE DATA in the Activity Section, and the prompt number changed to 200. The new menu looked like this:

```
A-View/Edit records
B-Quick Report
C-Custom Report
D-Report Lookup
E-Mailing Labels
P-Main Menu
M-Main Menu
```

The manual suggested selecting option A, which I dutifully chose. The other options vanished from the screen, and after a couple of carriage returns to select some default options, the sample record for Ms. Claire Anston appeared onscreen (see Figure 1). Apparently, Claire owns a nice condo with a microwave oven up on Gumdrop Way in Sugar City. She's willing to rent the place for $180 a month. Hitting return brought up sample record 2: Randall Automan's place in Kenosha, which comes with a boat.

> The file titled EXAMPLES contains some hypothetical records created to help you learn to use the program.

Once you have created files of your own, you can toggle forward and backward, one record at a time, or skip to any record with the file. You can use the Edit option to make changes. Control keys move the cursor to the desired spot, while others are used for erase, delete, and insert. Although the manual doesn't mention it, the PC's cursor movement keys continue to function normally (except the Insert and Delete keys, for which you must use ^V and ^G). Unlike editing form letters and reports, record editing is quite painless. It took me about 20 seconds to enter the edit mode, move the cursor down to the Amenities field in one of the EXAMPLES records, transorm Ms. Anston's microwave oven into an airplane, and then bail out to the View side of the Edit/View activity.

Field Work

Before you can edit files, though, you obviously need to know how to create them. Working with *Friday!*'s built-in format, you can designate appropriate fields such as name, address, salesperson, commission, and inventory number. *Friday!* classifies all fields under three general headings: Anything, Math, and Yes/No. An Anything field may contain letters, numbers, punctuation, and spaces. A Math field can contain only numbers, which can be added, subtracted, multiplied or divided by *Friday!*. The Yes/No field will accept only a Y or N. For example, a name or address field would be an Anything field. A number that needed to be computed, like a commission, would be a Math field, while a noncomputed number, like an inventory number, would be an Anything field. A field requiring only a yes or no response would fall under Yes/No.

Each field must be assigned a name, a field description, a length, and the number of decimal places. Once you have designed the proper field layout for your first file, *Friday!* opens a new file on the data disk under the name DATAFILE.ABB (DATAFILE.AAA is the EXAMPLES file supplied with the software).

The file-naming conventions are described in Appendix B of the manual, where I learned that *Friday!* maintains a separate five-field file on the data disk under the name SYSTEMF2.SYS. This file contains, among other things, the code (that is, the extension) of the last field you used, as well as the code that is assigned to each file, immediately followed by the name that you assigned to the file. For routine *Friday!* operations, you won't need to bother with the datafile codes, since the various option menus will take you step by step to whatever file you want, using the names that you assigned. However, if you want to do a little snooping, you can type

```
SYSTEMF2.SYS
```

from DOS to see where your favorite file went.

Once you have designed and saved the heading for a new file, you may begin adding records to the file. Using Peter

```
File: EXAMPLES                EDIT/VIEW        Record:     1                  20

LAST:NAME   [Anston                ]
FIRST:NAME  [Claire          ]
ADDRESS     [7655 Gumdrop Way          ]
CITY        [Sugar City            ]
STATE       [CO]
ZIP         [81076]
PHONE:NUM   [              ]
SALEPERSON  [RR]
TIME:AVAIL  [02/29/84]
BED:BATH    [01/01]
TYPE:UNIT   [CONDO]
DRIVER      [Y]
AMENITIES   [Microwave Oven                    ]
RENT:MONTH  [    180.00]
PERC:COMM   [ 0.590]
COMMISSION  [     10.62]

 E-Edit          X-Delete      F-File Menu          >-Forward
 Q-Quick Find    U-Undelete    L-Layout Menu        <-Backward
                 V-Video Off   S-Search Menu        M-Main Menu      Choice   [>]
```

Figure 1: *One of* Friday!*'s example records. The manual uses the examples to teach the program.*

```
File: EXAMPLES              DESIGN CUSTOM REPORT   Report Width: 80          406

Item  Line  Column  Contents                                                Length
====  ====  ======  ======================================================  ======

   1     5      15  [TRIM(FIRST:NAME) + " " + LAST:NAME                  ] [  27]
   2     6      15  [ADDRESS                                             ] [  25]
   3     7      15  [TRIM(CITY) + ", " + STATE + "   " + ZIP            ] [  22]
   4     9      15  ["Dear " + TITLE + TRIM(LAST:NAME) + ":"             ] [  16]
   5    11      20  ["Thank you for placing your rental home with Fant"] [  48]
   6    11      68  ["asy,"                                              ] [   4]
   7    12      15  ["Incorporated."                                     ] [  13]
                  - - - the rest of the letter goes here - - -
  18    13      20  ["Have a nice weekend."                              ] [  20]
  19    15      15  ["Sincerely,"                                        ] [  10]
  20    18      15  [LOOKUP SALEPERSON                                   ] [  51]
  21    19      15  ["Regional Manager"                                  ] [  16]

 1-LAST:NAME ,A,20   9-TIME:AVAIL,A, 8
 2-FIRST:NAME,A,15  10-BED:BATH  ,A, 5
 3-ADDRESS   ,A,25  11-TYPE:UNIT ,A, 5
 4-CITY      ,A,20  12-DRIVER    ,Y, 1
 5-STATE     ,A, 2  13-AMENITIES ,A,32
 6-ZIP       ,A, 5  14-RENT:MONTH,M,10
 7-PHONE:NUM ,A,13  15-PERC:COMM ,M, 6
 8-SALEPERSON,A, 2  16-COMMISSION,M,10

A-Add Item         I-Insert Item        <-Page Up

E-Edit contents    X-Delete Item        >-Page Down      P-Previous     [ ]
```

Figure 2: Friday!*'s screen display for preparing a form letter.*

Norton's Disklook utility, I found that the EXAMPLES file in *Friday!* appears to be stored as a conventional random-access file, preceded by data that describes the design of your fields. A brief inventory file was designed and written following the sample in the manual, and this appeared in the same format.

Operating Logically

When you have a file set up, you can use logical operators to selectively display data from certain records. Working with the hypothetical EXAMPLES file, if you set the retrieval rule to read

```
COMMISSION>100 .AND.
LAST:NAME <''N'',
```

the program will display on the records of salespeople with a commission greater than $100, and whose last names begin with a letter between A and M. Changing the retrieval rule to

```
''TENNIS''$!(AMENITIES)
```

will reveal only those records in which the property included a tennis court listing in the Amenities field. A logical operator that includes something like

```
.AND. BALANCE>0
```

will keep your nasty letters from going to people who don't deserve them.

The logical operators are useful for preparing custom reports—the program's catchall title for all the different forms it produces: letters, invoices, inventories, etc. The lesson that teaches you how to create custom reports focuses on form letters (see Figure 2).

The manual claims that *Friday!* is a lot faster than one of the add-on mailing programs. But for editing, if you really want to go fast, use DOS' EDLIN utility instead. Creating form letters with *Friday!* is time-consuming and laborious, and editing takes even longer. In order to correct a typo, you must first select the edit mode, then pass through the item number, line, and column before reaching the contents section. If you want to edit the next line as well, you must repeat the entire sequence. Even worse, only five of the contents lines will appear on the screen at a time.

Speaking of form letters, don't you love those little gems that begin "Dear John (or Jane) Smith" instead of with the more human "Dear Mr. (or Ms.) Smith" salutation? It's sort of a public announcement that you are being written *at* by a machine. Using a Title field and logical operators, it's possible to generate letters that are a little warmer. For example, the Title field could contain Mr., Mrs., Miss, Ms., Dr., and Prof. The salutation could become

```
''Dear'' + TITLE + '' '' +
TRIM(LAST:NAME) + '':''.
```

Even if you guess wrong on the title, the letter looks a lot more like the work of a human being. The TRIM instruction removes excess spaces in the field that might otherwise push the colon away from the end of the name.

> I was beginning to get the impression that Friday! cannot cope with external random-access files.

Friday!'s custom reports have one feature that is missing from several other file management systems. In the EXAMPLES file, each salesperson is listed by initials only. Using the Report Lookup option, it is possible to enter each salesperson's full name, which will later be substituted whenever the corresponding initials are found.

Experimental Interlude

Time out for a little experiment. I have my own random-access file, which I created several months ago to use with some sort programs. Let's see how it behaves on *Friday!*

Since I had already discovered that *Friday!* files must begin with field design data, I supposed that I must design my *Friday!* fields and then figure out a way to combine my old random-access file, names REVIEWS.RND, with my new *Friday!* file. Turning back in the manual to the fold-out chart, I discovered a box labeled "Combine File," so I figured I must be on the right track. Looking up "Combine Files" in the index led me to prompt 719: "Combine from which kind of file?[ ]". No doubt this was one of those Other File Activities that can be accessed from the Main Menu. Sure enough, there it was: D—Combine Data Files. Choosing this option brought me to the three choices listed under prompt 719. C—Text File (.TXT) looked promising, but the Combine Data Files display revealed the word "none," and nothing more. Back to DOS.

I renamed my file REVIEWS.TXT and then went back to *Friday!*. REVIEWS.TXT showed up under the Combine Data Files display. I was asked, "Combine from what file?[ ]," and I typed in REVIEWS without the .TXT extension. That seemed to do it. But when I attempted to view my new *Friday!* file, I just got fragments of what I expected to see, and none of the Search or Edit options seemed to function properly. Yet my original RANDOM file looked just like *Friday!*'s. Back to the manual to search for clues.

There was lots of talk about delimiters, and I was beginning to get the impression that *Friday!* cannot cope with external random-access files. But surely if this was the case, the manual would say something like, "Don't use a random-access file, you dummy."

Guess what? *Friday!* won't accept your random access files, but it will convert your sequential files into random-access files. I found this out the hard way by scrapping my work, converting my random file back into a sequential file, and starting all over again. Now *Friday!* works like a charm.

Try, Try Again

With *Friday!*, perseverance pays off. Another thing that caused me confusion and required a bit of detective work was the program's often-alluded-to math prowess. There are actually two separate sections in the manual that are titled, in large, boldface type, "Letting *Friday!* Do Your Math." The first occurs at the end of Lesson 2, but it is best ignored for the moment since it doesn't work. You can carefully follow the step-by-step instructions—and nothing will happen.

Lesson 3 then begins with more math instructions, which will apparently teach you how to let *Friday!* compute a salesperson's commission. The manual instructs, "If you want to see the amount of the COMMISSION now, type C." Don't bother. You'll just get the message, "No computed fields in this file. [RETURN] to continue."

The confusion persists. "You don't have to use the C-Compute option when adding new records. *Friday!* does this automatically on all added records as you go back to the main menu." Wrong again. *Friday!* still doesn't do a damned thing to the commissions. But the mystery will soon be solved.

At last, on page 3-34, math instructions that work! Following the appropriate menu options, select the Other File Activities display. Now comes the good part. Type B, which is the Computed Fields option, and the names of all the Math fields will be displayed. If you've created the short INVENTORY file, the screen will display:

```
3-QUANTITY
4-UNIT:COST
5-EXTENSION
```

After indicating that you want to compute the Extension, you simply type

```
QUANTITY*UNIT:COST
```

and save it. Now *Friday!* will do what it has twice promised (and failed) to do. The manual invites you to "move through the file and you'll see that *Friday!* computed all the commission for us."

Actually, Friday! computed all the *extensions* in the INVENTORY file. Following a similar procedure in the EXAMPLES file would, of course, compute the commissions.

The manual does manage to explain a few things clearly. Lesson 4 shows how to design your own custom layouts to be used in place of the standard FRIDAYFORM design. You can change the screen layout using the Screen Layout Grid shown in Figure 3. A Typing Guide option may be used to prevent the later insertion of improper character entries. For example, you may design a six-character field in which the first two characters must be numbers, the third must be a letter, the fourth and fifth may be anything, and the sixth may also be anything, but lowercase letters will be converted to uppercase. As you progress across a grid line, the layout option "looks ahead" and will not allow you to begin a new field if there is not sufficient room remaining on the line. The instructions are fairly simple, and they

(continued)

```
File: EXAMPLES              DESIGN A SCREEN LAYOUT                    130

---------10--------20--------30--------40--------50--------60--------70---

 1.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
 2.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
 3.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
 4.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
 5.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
 6.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
 7.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
 8.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
 9.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
10.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
11.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
12.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
13.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
14.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
15.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
16.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
17.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
18.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
19.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....
20.. .... .... .... .... .... .... .... .... .... .... .... .... .... ....

[ 1] LAST:NAME  Length:20  Type:Anything
A-Add   J-Jump    N-Next                        S-Save   D-Discard    [ ]
```

Figure 3: Friday!*'s Screen Layout Grid lets you tailor its basic forms to fit your needs.*

Spending Your Workdays With Friday!

This reviewer found Friday! full of convenience features and with sufficient power to satisfy all but high-volume users.

Ashton-Tate's *Friday!* system is not so much a *dBASE II* add-on or program generator as an embodiment of everything that can be done with the *dBASE II* application development language itself. *Friday!* is in fact written in *dBASE II*. Thus in theory, at least, whatever *Friday!* can do, a reasonably good *dBASE II* programmer can also do, perhaps with the aid of program generators like *Autocode 1* and QUICKCODE, and maybe even *dBASE WINDOW*.

Those of us who are less skillful or less ambitious will want to use *Friday!* as a simple file handler—the kind to which you might commit the contents of your telephone address book. If you run a small business, you might want *Friday!* to support your accounts payable procedures, namely, to maintain creditor records, provide monthly reports, and even print checks to be sent out by mail. Because *Friday!* files can be accessed by Lotus' *1-2-3* and *WordStar*, a triumvirate system can be maintained that will handle simple database requirements, the production of individually addressed letters, special forms and mailing labels, and a whole range of financial analysis and financial planning tasks. *Friday!* is relatively fast, and since it is menu-driven, there should be little cause for alarm for those who have never used a database system before. It contains nothing that would induce fear in even the greenest user. In fact, the system, especially the documentation, has been designed very carefully to give the impression that "the system knows what it is doing." It may not be the design of your dreams, but it beats those situations where neither you nor the system knows what's going on.

Options and Prompts

The main menu for *Friday!* contains four options—Enter Data, Retrieve Data, Other Activities, and Leave—and the question, What do you want to do? The prompt number at the top right of the screen is linked with a list at the back of the user's manual that gives the types of responses *Friday!* is expecting to receive at any particular point. This feature is very helpful if you draw a blank and don't know how to proceed.

The first major step in using *Friday!* to enter data is to design an input screen. The user has the opportunity to create three types of fields: Anything, Math, and Yes/No.

Anything fields can contain any symbol (letters, punctuation symbols, numbers, and spaces). Math fields will accept numeric information only and must be used if you are intending to produce totals and subtotals. The Yes/No field requires one of three responses—a Y, meaning yes, an N, meaning no, or an enter (carriage return), which is taken to mean no.

One of the most gratifying convenience features in *Friday!* is that you do not in all situations have to build input screens from scratch. The system provides FridayForm, a standard screen layout that can be used immediately to enter data; no laborious screen definitions need be given. Menu options that are quite simple to follow are given at the bottom of the screen.

If you want to produce calculated fields, *Friday!* will do them. If you want to put a password on a particular file or on a main menu, *Friday!* enables you to do so. If you want to produce a simple report quickly, *Friday!* provides a Quick Report option.

But vastly more important than *Friday!*'s level of software integration and its related convenience features is the intimate link *Friday!* has with Ashton-Tate's flagship product, *dBASE II*.

Since *Friday!* is essentially a "chip-off-the-old-block," its method of creating, storing, and manipulating data conforms to *dBASE II* conventions. This means that the large, unwieldy mailing list you created last year with *dBASE II* can be transferred into a much more forgiving environment. Likewise, if you have a lot of people in different departments using small *Friday!* databases, it is now possible, with a minimum amount of work, to merge these fragments into one comprehensive system at a future date.

Friday! provides a peek at what the full-blown *dBASE II* program can do. If you have small database requirements, that's fine. But if you want to move up to *dBASE II*, you don't have the nightmare task of keying in all your data again. You have what the marketing people like to call an "upgrade-path."

Friday! can do nothing beyond the limits of *dBASE II*, of course,—it will not allow more than 32 fields to appear in a screen, for example. And it is not recommended for those people or organizations that have a high volume of data to process each week. There is only so much *Friday!* can do before it begins to show signs of weakness. Nevertheless, for those users below the top end of the scale, *Friday!* is a first-rate tool for any workday.

—Robin Webster

allow you to create forms that fit your specific needs.

Friday! has a few more tricks. Once up and running, the program goes about its chores with great style, and most of the lower-screen options are easy to understand. The ever-changing prompt numbers are a nice touch for the beginner, but they don't get in the way later on when you no longer need them.

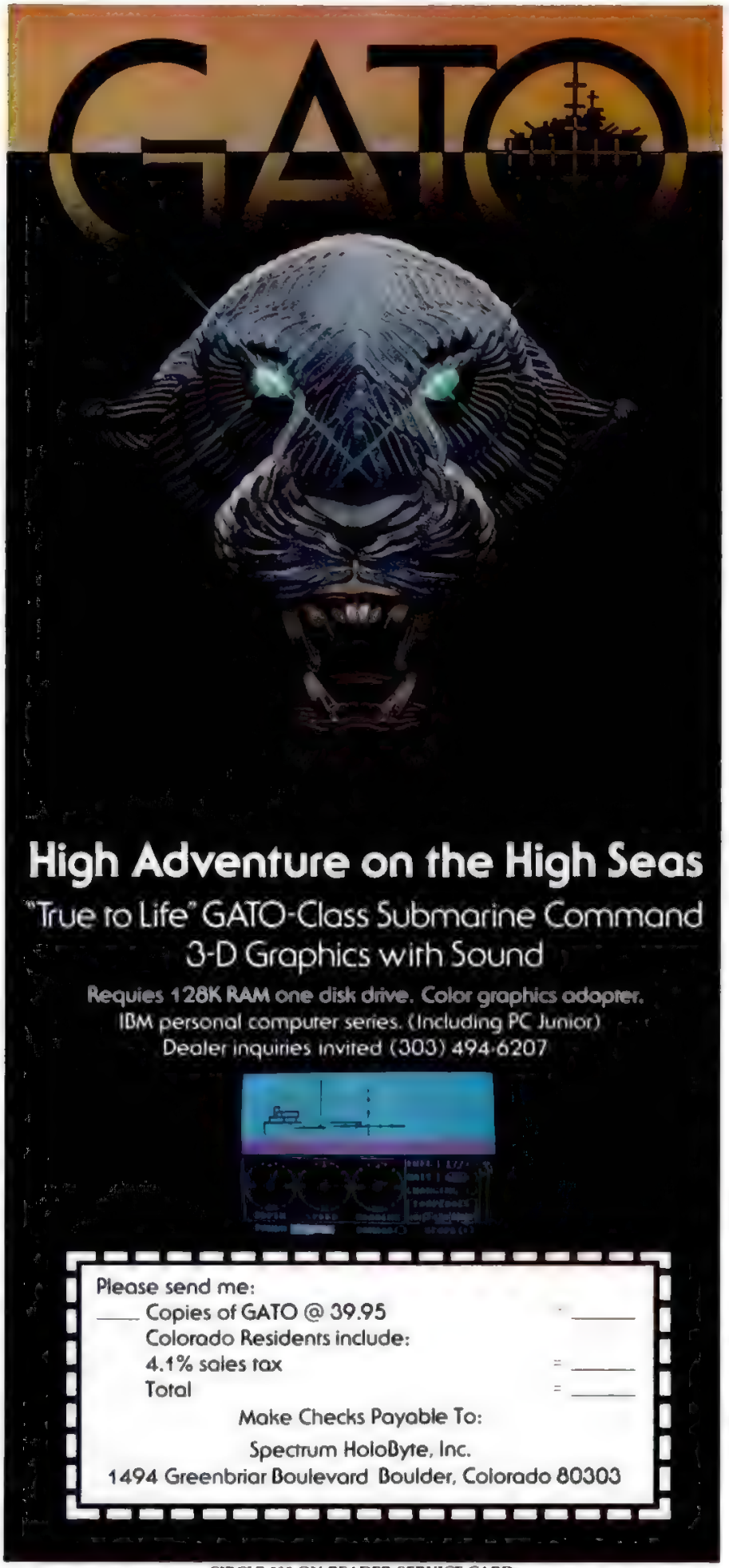
When you get used to its quirks, *Friday!* is actually quite an elegant package for, as the ad says, people who don't know much about computers. Unfortunately, some parts of the manual seem to have been written by people who don't know much about the people who don't know much about computers. The sections on moving files in and out of the *Friday!* system are particularly obscure, and the premature math instructions are frustrating.

After you run out of patience with the manual, you'll be as glad as I was to find that Ashton-Tate's phone support system actually works. After an understandably long hold, I managed to reach someone who was happy to answer my questions and who invited me to call again if I liked. It was a welcome surprise for this phone-scarred *WordStar* victim.

The cumbersome manual isn't the only source of frustration. *Friday!* has some problems of its own. Compared with other data management systems, the various set-up procedures take a long time. And unlike many other programs, you can't anticipate the next instruction once you become familiar with the system. Typing a response prematurely won't crash the program but will often bring it to a halt, leaving you with an incomplete display. Pressing Return will usually get things moving again, but it is slow going.

Perhaps that's just part of the price for an off-the-shelf, do-everything system. A tailor-made program that did just what you wanted would surely run a lot faster and cost a lot more.

Well, Ashton-Tate, I don't know whether this was what you meant when you said "Have a nice weekend," thank God it's Monday! ■



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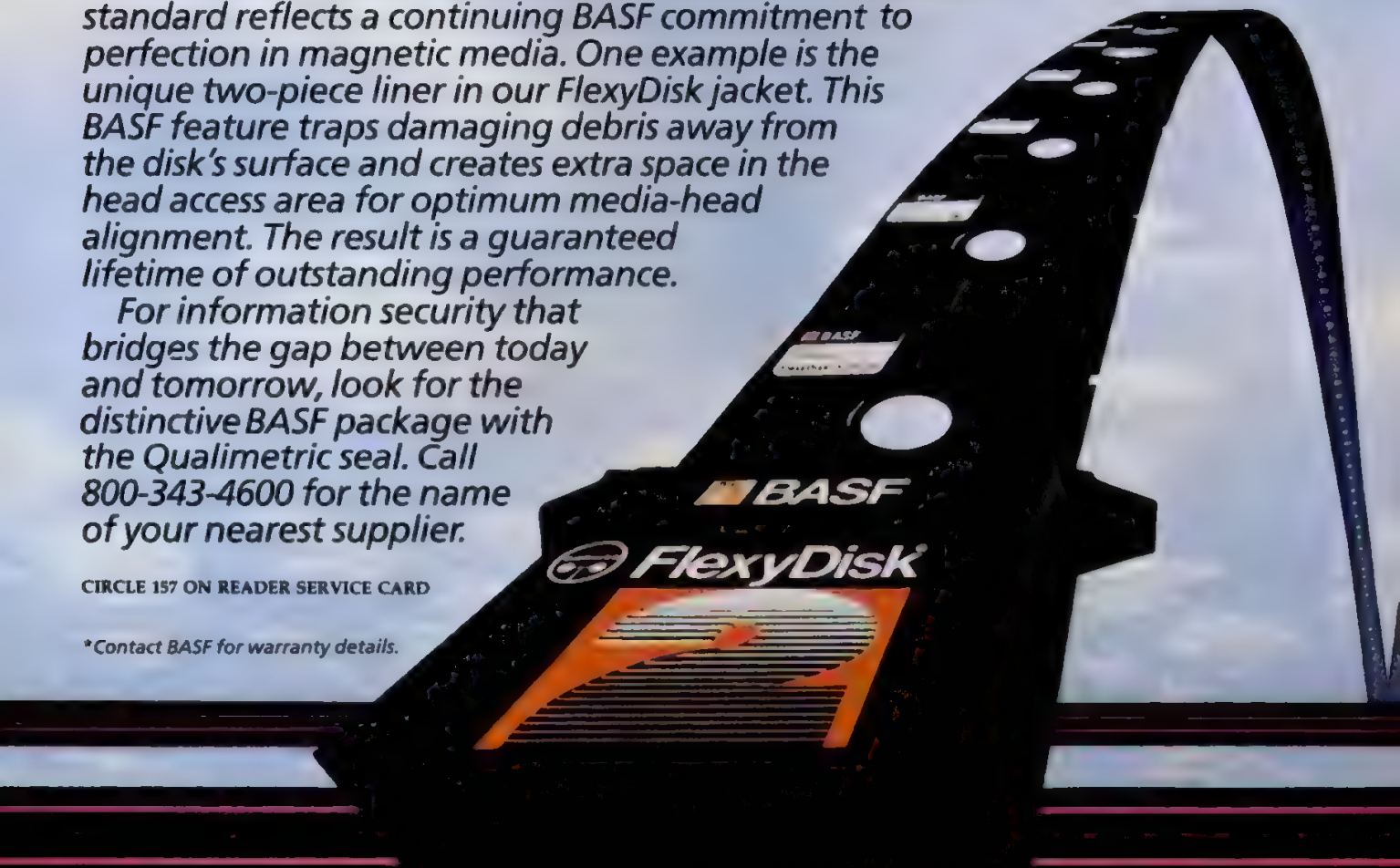

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Extenders: Pushing dBASE II To The Limit

Though dBASE II can do many things, companies all over the country are marketing extenders that give the program added power for mathematical and graphics applications.

Nothing is perfect, not even *dBASE II*, the leading database for microcomputers. Its imperfections include the fact that its sort is very s . . . l . . . o . . . w and limited to one field at a time. Also, *dBASE II* has no graphics at all. And, since it was designed for file handling and not scientific applications, *dBASE II* lacks higher-level math, double-precision calculations, trigonometric functions, exponentiation, and statistics tools. Finally, there are no arrays in *dBASE II*.

Plugging the gaps in *dBASE II* by correcting its faults or expanding its virtues has become an active business for software writers and publishers. For them, *dBASE II* provides a broad set of coattails on which to hang their entries into the marketplace.

This article will present five extenders that either add new features to *dBASE II* or give you new powers when using *dBASE II* files. Though many products exist in the market, these five show the range of add-ons available for *dBASE II*.

Extenders for *dBASE II* may either be "add-ons" (standalone products that run outside *dBASE II* but operate on *dBASE II* data files) or "add-ins" (products written in machine language that are loaded with and run from within *dBASE II*).

GRYPHON Microproducts of Silver Springs, Maryland, is marketing two add-in packages: *dBRx*, which provides machine language routines to do higher-level math functions, and *dB/RA*, which adds large-scale array capability to *dBASE II*. Let's look first at *dBRx*. *(continued)*

An Add-in to Help You Add Up

Wish you could handle trigonometric functions, logarithms, and square roots in *dBASE II? dBRx* makes it possible. The package works by copying the *dBASE II* files onto a diskette containing *dBRx* and its library of functions and examples. You then type DBASE DBRX and the *dBASE II* sign-on is followed by the *dBRx* sign-on. (The sign-on includes GRYPHON's phone number, which is an indication of the company's user support. If you can follow the examples given in the 6-page manual and look at the example files on the *dBRx* diskette, you should find the going smooth.

With the *dBRX* extender, students, engineers, and researchers can use *dBASE II* to solve the following functions: sine, cosine, arc, tangent, square root, log base 10, Naperian log, exponential (e to the FN::EXP power). These math functions are all accessed in the same way. After *dBRx* is loaded in with *dBASE II*, you use the following code:

```
STORE <number> TO
FN::<function name>
DO <function name>
? FN::<function name>
```

The result is displayed on the screen if you have set TALK ON; otherwise, it resides in the variable FN::(function name).

dBRx also includes three string-function routines: PACK condenses multiple spaces down to single spaces within a string; BTRIM removes leading blanks; and NOSPACE removes all spaces. Though the syntax of these routines is different from that of the math functions, they are just as easy to use:

```
SETCALLTO<functionaddress>
CALL <string name>
? <string name>
```

The function addresses are 5-digit memory addresses that you either have to memorize or look up, but other than that it is smooth sailing.

dBRx is easy to understand and adds some interesting features to *dBASE II*. But is it worth $150? The answer depends on how badly you want the math functions. If having the advanced math routines inside *dBASE II* will simplify your applications, then this is an easy way to get them in a quality program. If you have your eye on heavier statistical applications, read on.

> Plugging the gaps in dBASE II has become an active business for software writers and publishers.

Arrays in 3-D

GRYPHON's second *dBASE II* add-in is *dB/RA*, which adds over 65,000 locations of memory capacity with a 128K RAM PC-compatible system. This program allows the *dBASE II* programmer to use one-, two-, or three-dimensional arrays of logical, numeric (10 digits stored as 6 bits), or character (<255 characters) variables (one type per array). With a consistent syntax the user can enter the commands DIMENSION, DISPLAY, SAVE, RESTORE, and CLEAR for all or part of an array without interfering with *dBASE II* memory variables. (GRYPHON recently announced that *dB/RA* now has a Find function, allowing users to locate specific items in an array.) Communication with *dBASE II* memory is accomplished by issuing the command STORE (to the array) and LOAD (from the array). The syntax is always: CALL <*dBASE* memory variable ><dB/RA COMMAND>.

GRYPHON let me preview a test copy of this program, which did have some bugs that needed to be worked out. For instance, I had difficulty using it with *dBASE II* version 2.4. Part of the array kept getting wiped out. Allan Weiner, the program's author/publisher, called back with a patch the morning after he learned of my problem. I added one line to the *dB/RA* file and presto, everything worked fine.

Documentation consists of 15 pages of straightforward text with examples of each command and its results. To get a *dBASE II* file into an array, you write a program to store the field to a memory variable and store the memory variable to the proper array address. Users who chafe at the memory limits of *dBASE II* will be thrilled to discover that *dB/RA* allows you to handle the equivalent of 12 *dBASE II* files in memory at one time! *dB/RA* can also be loaded after *dBRx* to combine their capabilities.

dB/RA is tentatively priced at $200, which, added on to the price of *dBASE II*, is a hefty sum. Its worth it, however, if you use a lot of complex data, since it speeds up certain operations immensely. Developers should note, however, that a separate copy of *dB/RA* (or *dBRx*) is needed for each *dBASE II* system, and this cost must be figured into the pricing of any software system using it.

Grafting Graphics onto dBASE II

dBASE II has no graphic capabilities because it was intended for a wide range of terminals in the CP/M world—each of which has a different graphics system, if any at all.

dGRAPH, a standalone add-on extender to *dBASE II*, produced by Fox and Geller of Elmwood Park, New Jersey, makes graphs either on screen or on a printer. The program works from data manually entered into a special *dGRAPH* file, or through the *dBASE II* CONNECTION, a utility program that processes a *dBASE II* file into a series of *dGRAPH* files (data, screen bit image, graph definition parameters, print image).

In theory, a standalone product specializing in creating graphs from *dBASE II* should be a terrific tool. In actuality, *dGRAPH* is very difficult to use. First, it has a limited capacity in terms of the number of fields it can handle on a single graph. Checking the manual, I found that

dGRAPH handles only four columns of data with up to 52 rows or periods, no matter which of its formats you specify.

As if that weren't enough, the *dBASE II* connection in *dGRAPH* can read or combine data from only two *dBASE II* fields. And it takes 1 minute and 20 seconds for a change in a parameter to be translated into a new graph on the screen.

The PC user is likely to find this program mighty unfriendly. *dGRAPH* seems to have its own standard for cursor moves and field selection. For instance, none of the arrow keys move the cursor either within fields or between them when you are attempting to set up a chart. The left arrow maddeningly wiped out the field. In fact, almost any key wiped out a field (or filename).

Further, while the PC version provides the option of viewing a graph on the screen, which the 8 bit version doesn't have (compatibility problems again), the documentation was not updated except for a supplementary section slipped into the package. Since the filenames are different in the PC version, I found the documentation very confusing.

There were other annoying problems, too. For instance, the date had to be entered manually. Worse, the date was wiped out when the cursor passed over it, and sometimes for no apparent reason at all. Paradoxically, the program keeps track of so many files that I found it confusing.

And I found yet another problem: the program crashed several times and returned to the system prompt. This happens frequently if you respond to a mistake with the Esc key. Logging B: to the work drive inside *dGRAPH* is disastrous since the program crashes when it can't find files.

With great trepidation, I tried using *dGRAPH* on a small, two-field *dBASE II* file. The file contained a field called "amount" and one called "category." The category field contained either an "A" or a "B." After much trial and error, *dGRAPH* finally produced a graph with two bars representing the sum of the items in each category. The program automatically labels the graph according to the names of the fields being charted. At first the labels did not appear and none of the shadings I had chosen were used. Finally, I guessed that the AUTOGRAPH setting had to be turned off (the manual shows that AUTOGRAPH can be on and you can still select shadings) and something closer to what I wanted appeared on the screen. But the bars were awkwardly far apart, and I could never figure out how to move them closer to each other. I finally gave up after having spent 8 hours attempting to learn this program. I was unable to produce even one acceptable graph.

> In theory, a standalone product specializing in creating graphs from dBASE II should be a terrific tool.

DBPlus Does Its Job

DBPLus, produced by Humansoft, in Arlington, Massachusetts, is a program that performs a few functions smoothly and in a convenient, menu-driven format running outside of *dBASE II*. It traps errors very well and can be learned in less than 2 hours.

DBPlus' menu gives you a choice of three functions: Fast Sort, Compression, and Transform. Fast Sort is designed to compensate for *dBASE II*'s slow sorting ability. *DBPLUS*, using the speed advantage of the language C, runs fast, multiple-field (up to 32 in one pass) sorts on *dBASE II* files. The cursor moves easily and predictably from field to field as you choose the key for sorting from the display of field names in your *dBASE II* file.

The Transform function creates a new *dBASE II* file from your old one. You can add, delete, change file names, or create output for *WordStar*, again in the menu format. The process leaves you confident that you won't damage your existing file and substitutes a single, menu-driven process for the two or three steps necessary to get the job done in *dBASE II*. For beginning and intermediate *dBASE II* users, this is a tremendous help.

The Compress function creates a version of your *dBASE II* file that is 30 to 40 percent of its original size. If you are archiving on floppies, this can be very useful. The file created is readable only by *dBPLUS* and requires decompression before *dBASE II* can read it. The other use of the Compress function is for data transmission. With a copy of *dBPlus* at both ends of the line, the savings in time and charges are substantial. The program could easily pay for itself if you frequently send files by modem.

DBPlus has few weaknesses. For instance, it fails to remember the settings for its last operation, so if you want to sort and then transform or compress, you have to enter everything all over again. The manual has a few typos, some of which are covered in the errata, some of which are not. In several places, the manual instructs you to press the Esc key when you should use the space bar. No disaster results—only the inconvenience of having to start over, but this should be corrected in a future edition.

Help with Statistics

ABSTAT, from Anderson-Bell, in Canon City, Colorado is a big package (it arrives on three single-sided diskettes) dealing with the complex area of statistics. Even so, it is remarkably easy to use. *ABSTAT* has its own command language which is easy to master, especially for experienced *dBASE II* users. Those who are not as familiar with *dBASE II* should note that *ABSTAT* is totally self-sufficient and has three different ways of handling files. The FETCH and SAVE commands (to store and retrieve files from disk) work with *ABSTAT*'s own SDF (single-preci-

sion) and DDF (doule-precision) files; Read and Write work with ASCII (from BASIC), and dBREAD and dBWRITE with, you guessed it, *dBASE II*.

ABSTAT's command language contains a very powerful set of data handling tools. You can rearrange, sort, transform, create new variables using complex equations, extract random cases for analysis from a file, select using Boolean criteria, and combine data sets or subsets. You could use this as a *dBASE II* file transformer, except that it works only on numeric variables. If you need to rearrange numbers, however, you will find nearly every operation you need in the DATA SET commands.

The mathematics in *ABSTAT* are done in 16-bit systems in 64-bit, double-precision floating point. This provides more accuracy when working with very large numbers or critical data. Because the software version of 64-bit floating point is much slower, Anderson-Bell recommends the use of the 8087 coprocessor with *ABSTAT*.

REPORT commands in *ABSTAT* allow you to turn the printer on and off, change line length, and append a "text" file containing descriptive information to your data report.

Statistical commands include one-way and two-way Analysis of variance, chi-square fit, correlation, descriptive statistics (mean, standard deviation, variance, standard error of mean, coefficient of variation, median, mode, minimum, maximum, range, skewness, and kurtosis). It also performs frequency distribution, Z-scores, Mann-Whitney U test, T tests, F tests, binominal and Poisson distributions, multiple linear regression analysis, Spearman rank correlation, and cross tabulations. If the test you need is among these, you should definitely consider *ABSTAT* for its ease of use.

ABSTAT also produces two types of graphs using the standard text mode on your printer. The command BARG yields a bar graph or histogram, and PLOT gives a two-variable scatter plot of your data.

The 93-page perfect-bound manual is well organized, clearly written (even for statistical amateurs), and indexed. Every error that we made in trying to learn the program was covered somewhere in the manual. Running statistics on your data with *ABSTAT* is so easy you'll want to run all of them. The challenge is to know which tests are meaningful for your purposes and what to do with the results.

Conclusion

I have attempted a brief overview of five programs that extend the capabilities of *dBASE II* in the areas of mathematical functions, array graphics, sorting, compressing, transforming, and statistics. These programs illustrate the support *dBASE II* is getting from third parties.

Putting all these features into your *dBASE II* library would cost $1,165 at retail. That is a lot to add on top of a $700 database. It's up to you to decide whether the add-ons are worth the price. ■

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dBASE II Extenders

Five programs that let your database management system manage better.

dBRX
GRYPHON Microproducts
P.O. Box 6543
Silver Spring, MD 20906
(301) 946-2585
Price: $150
Requires: 64K RAM

CIRCLE 718 ON READER SERVICE CARD

DB/RA
GRYPHON Microproducts
P.O. Box 6543
Silver Spring, MD 20906
(301) 946-2585
Price: $200
Requires: 96K RAM

CIRCLE 717 ON READER SERVICE CARD

ABSTAT
Anderson-Bell
P.O. Box 191
Cañon City, CO 81212
(303) 275-1661
Price: $395
Requires: 128K, one double-sided disk drive

CIRCLE 716 ON READER SERVICE CARD

DBPlus
Humansoft
661 Massachusetts Ave.
Arlington, MA 02174
(617) 641-1880
Price: $125
Requires: 128K, one double-sided disk drive

CIRCLE 715 ON READER SERVICE CARD

dGRAPH
Fox & Geller
604 Market St.
Elmwood Park, NJ 07407
(201) 794-8883
Price: $295
Requires: 48K, one double-sided disk drive

CIRCLE 714 ON READER SERVICE CARD

Judging The Guides: Here Come dBASics

A profusion of books, disks, cassettes, videocassettes, and keyboard templates can be found on the market for dBASE II training. Which are the right ones for you?

Just as IBM left a hole in your pocket big enough to accommodate a truckful of RAM chips when it charged arm-and-a-leg prices for extra memory on its early PCs, Ashton-Tate has created a giant niche in the educational-training market for companies that wish to improve the dry, succinct manual that comes with *dBASE II*, its best-selling $700 database program. While the program's quality and clout in the microcomputer marketplace make it the standard in database software, nothing even close to comparable can be said about the accompanying 302-page instruction manual. To find information on any topic, the user has to look in two or sometimes a half-dozen places; the two parts of the manual (user's guide and reference book) are labeled A and B in the index and R and G (for red and gray, the section divider colors) on the command summary card. But you'll be glad to learn that help is at hand.

At last count, more than 30 products are now or will soon be available to help you learn *dBASE II*. A novice could part with better than $1,000 trying out all the learning aids. But there's no need to spend that much. I'll take a look at the products and help you sort out the pretenders from the stars. You can choose among guidebooks, diskette tutorials, cassette tutorials, videocassettes, and keyboard templates. The costs range for these learning aids from $15 for a keyboard template to $200 for the videocassettes.

Weightlifters who live by the motto, "no pain, no gain" would understand *dBASE II*. Serious time and effort are required to master its intricacies, and the shortcuts are few. Learning this complicated program isn't a 20-minute proposition. Nevertheless, why do you ask for help by typing Ctrl-J and not Ctrl-H? There's no rhyme or reason here.

Most of the training material for *dBASE II*, in contrast, bring the novice to a plateau of competence quickly. From there, he can generate competent work and build up enough confidence for the prolonged assault on the *dBASE II* mountain.

Books to Teach dBASE II

What typewritten (not typeset) book with no illustrations and a high-school print-shop binding is worth $29? Don't answer "none." Save your complaints, and do your muttering en route to the bookstore. Even at its price, Adam Green's *dBASE II User's Guide* is a good value and one of the best learning tools for *dBASE II*.

The book is also widely available; more than 65,000 copies have been sold. And it's a good thing—when you crack open Ashton-Tate's *dBASE II* manual, you'll retreat in shock. Adam Green's book may help you recover.

This author has a sense of humor, which makes for easier reading and learning. In illustrating a likely application for a name and address mailing list program, for example, he conjures up a mythical Story Book University, which he describes as: this line for fund raising: "Like many other universities, its primary purpose is to collect contributions from its alumni."

Although Green does not cover every possible command and application, what he includes is more than adequate to get you going. Were he to add an appendix of *dBASE II* definitions and offer more details about transferring files between *dBASE II* and word processing programs such as *WordStar* and *MailMerge*, his contribution would be even greater.

Everyman's Database Primer: Featuring dBASE II by Robert A. Byers is a how-databases-work book that uses *dBASE II* for all its examples. This isn't surprising, since the book is copublished by Ashton-Tate.

While Green uses a mailing list as his main example, Byers chooses a liquor store inventory to show the "relational" nature of *dBASE II*. Relational is a fancy way of saying each piece of information in the database can be sorted, indexed, and combined (arithmetically or otherwise) with every other piece.

If you're looking for a database program and you need to learn more about databases and believe *dBASE II* is eventually going to be your choice, this is the book for you. The examples amount to a fairly effective *dBASE II* primer. No prospective user should be scared off. The fundamentals of *dBASE II* are actually easier to learn than those of *WordStar*, Micro-

> Weightlifters who live by the motto, "no pain, no gain" would understand *dBASE II*.

Pro Corporation's word processing program, another standard in the microcomputer marketplace. This is so because *dBASE II* commands such as CREATE (create a new database file), DISPLAY ALL (display the contents of the database onscreen), APPEND (add more information), or LIST FOR AREA:CODE = '212' (list everybody in New York City) have been assigned logically and are easy to understand. In comparison, *WordStar* commands are less obvious. For instance, why does Ctrl-OX, not Ctrl-MR, release the margin?

Beginning and Advanced dBASE II Techniques by Leslie N. Shohan and Paul D. Baril is a useful reference, full of tips for people who already know *dBASE II*. Contrary to the title, this book is not for beginners. The authors, who appear to have a good grasp of their material, offer methods to speed up operations, conserve disk space, and format printouts. For someone who's using *dBASE II* regularly, the book is worth the $25 price. Casual users, who are using dBASE only to store phone numbers, for instance, don't need this book.

Using dBASE II by Carl Townsend is a thorough and helpful book, which is probably most useful for businesses or individuals who want to write fairly complex programs. It covers linking multiple *dBASE II* files, program development procedures, problems with *dBASE II* on multiuser PC systems, and ways to speed up programs. Anyone who hasn't had previous experience with a PC, however, will find *Using dBASE II* difficult.

A minor but annoying flaw is the tutorial's willingness to accept upper or lowercase commands. Typing the word *display* has the same effect as typing DISPLAY. This may not be so bad, but the program also accepts a lowercase version of the name jim in an exercise searching for the name spelled with a capital *J* (Jim). The actual *dBASE II* program would balk because it would recognize that the two versions are different. In any case, you can't beat the cost—it's free.

A company called Cdex offers disk tutorials that you have to pay for. These stand out from the competition. If any disk tutorial is worth paying cold cash for, *Cdex Training for the dBASE II Program* is. Its pace is an easy learn-and-review three-step, not quite as rapid as Ashton-Tate's. It lets you acquire a bit of information, formulate a question, ask for a summary of what you learned, and then on to more material.

Each question offers five options, which allow you to exit from the program, get a hint first, return to the menu, review the material for a bit longer, or skip the question entirely. If you answer a question incorrectly, the program gives you a hint. After three false tries, the machine gives you the right answer.

Finally, Cdex provides a manual of information with exercises. Although at $70, the price is right, it does have some drawbacks. For instance, it won't run readily in color if you have both a monochrome display and a color monitor, unless you pull out the mono card or open up the computer and flip a switch on the motherboard. Unlike other Cdex tutorials where the sound effects can be turned off, Cdex's *dBASE II* offering serenades you with beeps and bloops, regardless of your preference. And there's no option that allows you to select your own pace for each lesson.

(continued)

A Product Sampling

Numerous manufacturers and publishers are offering instructional aids for *dBASE II*. Here's a list of the products, some of which are reviewed in the article.

Books

Everyman's Database Primer: Featuring dBASE II
Robert A. Byers
(Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230; [213] 204–5570; 1983)
295 pp.; soft cover; $19.95

CIRCLE 713 ON READER SERVICE CARD

dBASE II for the First Time User
Alan Freedman
(Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230; [213] 204–5570; forthcoming)
225 pp.; soft cover; $19.95

CIRCLE 710 ON READER SERVICE CARD

Advanced Programmer's Guide
Jay Hanson, Thomas Rettig, and Luis Castro
(Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230; [213] 204–5570; forthcoming)
275 pp.; soft cover; $28.95

CIRCLE 709 ON READER SERVICE CARD

Beginning and Advanced dBASE II Techniques
Leslie N. Shohan and Paul D. Baril
(Compudex Corporation, Box 147, Natick, MA 01760; [617] 235–5152; 1983)
112 pp.; hard cover; $25 ($3 shipping)

CIRCLE 712 ON READER SERVICE CARD

dBASE II Guide for Small Business
Robert T. Schadewald
(Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230; [213] 204–5570; forthcoming)
225 pp.; soft cover; $24.95

CIRCLE 708 ON READER SERVICE CARD

Using dBASE II
Carl Townsend
(Osborne/McGraw-Hill, 2600 10th St., Berkeley, CA 94710; [800] 227–0900, [800] 772–2531 [CA]; 1983)
250 pp.; soft cover; $18.95)

CIRCLE 707 ON READER SERVICE CARD

Advanced dBASE II User's Guide
Adam B. Green
(SoftwareBanc, 661 Massachusetts Ave., Arlington, MA 02174; [800] 451–2502, [617] 641–1241; forthcoming)
176 pp.; soft cover; $29

CIRCLE 711 ON READER SERVICE CARD

dBASE II User's Guide, revised and updated
Adam B. Green
(SoftwareBanc, 661 Massachusetts Ave., Arlington, MA 02174; [800] 451–2502, [617] 641–1241; 1983)
152 pp.; soft cover; $29

CIRCLE 706 ON READER SERIVCE CARD

Report Writing in dBASE II
The Staff of SoftwareBanc Technical Services
(SoftwareBanc, 661 Massachusetts Ave., Arlington, MA 02174; [800] 451–2502, [617] 641–1241; forthcoming)
120 pp.; soft cover; $11.95

CIRCLE 705 ON READER SERVICE CARD

Understanding dBASE II
Alan Simpson
(Sybex, Inc., 2344 6th St., Berkeley, CA 94710; [800] 227–2346, [415] 848–8233; forthcoming)
220 pp.; soft cover; $22.95

CIRCLE 704 ON READER SERVICE CARD

Cassette Tutorials

dBASE II Cassette Tutorial (one cassette)
Computer Literacy Training Systems
12900 Preston Rd., #500
Dallas, TX 75230
(214) 233–7638
List Price: $15
Requires: Cassette recorder.

CIRCLE 703 ON READER SERVICE CARD

How to Use dBASE II (4 cassettes and user's guide, forthcoming)
FlipTrack Learning Systems
999 N. Main St., #200
Glen Ellyn, IL 60137
(312) 790–1117
List Price: $75
Requires: Cassette player, preferably with counter.

CIRCLE 700 ON READER SERVICE CARD

(continued)

dBASE II Tutorial: Beginning, dBASE II Tutorial: Advanced (1 cassette each)
Micro Instructional, Inc.
3453 N.W. 55th St.
Fort Lauderdale, FL 33309
(305) 485–6880
List Price: $49.95 (beginner's) $69.95 (advanced)
Requires: Cassette recorder.

CIRCLE 701 ON READER SERVICE CARD

dBASE II Personal Tutor (Three 90-minute cassettes)
Personal Tutor Associates
Box 246
Clinton, MD 20735
(301) 856–2280
List Price: $59.95 ($2.50 shipping)
Requires: Cassette recorder.

CIRCLE 702 ON READER SERVICE CARD

Diskette Tutorials

MicroTutor for dBASE II
Advanced Systems, Inc.
2340 South Arlington Heights Rd.
Arlington Heights, IL 60005
(800) 238–2625; (800) 238–2626 (IL)
List Price: $78
Requires: 64K RAM, 1 disk drive

CIRCLE 697 ON READER SERVICE CARD

Ashton-Tate dBASE II On-Disk Tutorial (one tutorial disk)
Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204–5570
List Price: Free with *dBASE II* sold after September 6, 1983 ($700), $70 to current *dBASE II* owners, or free if older *dBASE II* updated to current version 2.4.
Requires: *dBASE II*, 64K RAM, one disk drive.

CIRCLE 695 ON READER SERVICE CARD

ATI Training Power: dBASE II Volumes 1 and 2 (2 diskettes, user's guide)
American Training International, Inc.
3770 Highland Ave., #201
Manhattan Beach, CA 90266
(213) 546–4725
List Price: $40 each of $75 for both ($2.50 shipping)
Requires: 64K RAM, one disk drive.

CIRCLE 699 ON READER SERVICE CARD

Cdex Training for the dBASE II Program (3 diskettes, reference guide)
Cdex Corporation
5050 El Camino Real
Los Altos, CA 94022
(800) 982–1213, (415) 964–7600
List Price: $69.95
Requires: 64K RAM, one disk drive.

CIRCLE 698 ON READER SERVICE CARD

Beginning Instruction for dBASE II
Data Processing Educational Corporation
4588 Kenny Rd.
Columbus, OH 43220
(614) 457–0577
List Price: $50
Requires: 64K RAM, one disk drive.

CIRCLE 696 ON READER SERVICE CARD

Teach Yourself dBase II on the IBM PC
Teach Yourself dBase II on the IBM PC: Extended Features (2 diskettes each and textbook)
DELTAK Microsystems, Inc.
East/West Technological Center,
1751 West Diehl Rd.
Naperville, IL 60566
(800) 532–0786, (312) 369–3000
List Price: $70 each
Requires: 64K RAM, one disk drive.

CIRCLE 694 ON READER SERVICE CARD

Keyboard Templates

Kleertex Template for dBase II
Creative Computer Products, Inc.
Box 85152 - MB 134
San Diego, CA 92138
(800) 231–5413, (800) 523–5441 (CA), (619) 268–0793
List Price: $32.95 ($1.95 shipping)
Requires: Fits IBM PC style keyboard

CIRCLE 693 ON READER SERVICE CARD

PC-DocuMate DB-200 for dBase II
Systems Management Associates
3700 Computer Dr., Box 20025
Raleigh, NC 27619
(919) 787–7703
List Price: $14.95
Requires: Fits PC-style keyboard.

CIRCLE 692 ON READER SERVICE CARD

Videocassettes

dBASE II: An Introduction to the Command Language
ANDERSON SOFT-TEACH
2161 Blossom Valley Drive
San Jose, CA 95124
(800) 227–3800 x 400; (408) 356–3552
List Price: $195
Requires: Videocassette recorder.

CIRCLE 691 ON READER SERVICE CARD

dBASE II Fundamentals by Adam B. Green (forthcoming) (Two 90-minute tapes; 125-page notebook)
SoftwareBanc
661 Massachusetts Ave.
Arlington, MA 02174
(800) 451–2502, (617) 641–1241
List Price: $295
Requires: Videocassette recorder.

CIRCLE 690 ON READER SERVICE CARD

The whole Cdex course would fit onto two double-sided disks, but instead you get four single-siders. A Cdex spokesman offered this lame excuse: "We'd have to stock too many formats." The company should have acknowledged that most of the PC Universe is running on double-sided drives and stock a double-sided format that offers a choice of one or two drives? Because they're copy protected, a Cdex disk can't be loaded onto a PC XT hard disk or a RAM disk.

Cdex is a number one manufacturer of disk tutorials, and overall the company did a nice job with its *dBASE II* product.

DELTAK Microsystems disk tutorials consists of two courses, *Teach Yourself dBASE II on the IBM PC* and *Teach Yourself dBASE II on the IBM PC: Extended Features*. The programs might appeal to those who don't click with Cdex. At $70 each, however, they have some problems. *Extended Features* is not all that extended. It includes the commands COPY, MODIFY STRUCTURE, SORT ON, DELETE FILE, COUNT, SUM, and REPORT, which are fundamental commands and are covered in most of the other available disk and cassette tutorials.

Cost aside, DELTAK's programs are good. The instructions for starting up the program the first time are excellent. They provide details for PCs equipped with one, two, and hard-disk drives in various combinations. Deltak's programs run under both DOS 1.1 and 2.0, but it works better with the former.

You can pace your own progress through the tutorial by using several Cue and Review commands. For example, Ctrl-p allows you to skip directly to the practice exercises in any lesson. Are you feeling unsure of yourself? Ctrl-r offers you a review before you brave the practice questions. Do you wish to return to *dBASE II*'s menu of learning topics for another go-around. Ctrl-o allows you to do so at any time.

DELTAK Microsystems' tutorial offers more practice questions than Cdex—too many more for some users, perhaps. Overall, the product isn't bad, despite its rather steep price.

American Training International (ATI) is one of the big names in the microcomputer training field. The company says its monthly shipments of training programs are valued at more than $500,000.

ATI's *ATI Training Power: dBASE II*, usually sold as a two-volume set for $75, offers a quick tour of *dBASE II* fundamentals in Volume 1, and programming, screen formatting, and writing menu-driven programs in Volume 2. The company has abandoned its unsophisticated red cardboard binders in favor of an IBM-style slipcase and a vinyl notebook for documentation. The first volume is a snap to run through—someone who knows a bit about computers (someone familiar, say, with *VisiCalc* or *EasyWriter II*) could polish it off in 30 minutes and feel confident about going solo with *dBASE II*.

Professional educators may argue that quizzes can reinforce what has been learned, but my gut reaction is: "Enough already."

Unfortunately, if you do this, you might find yourself in trouble. ATI's training is, to put it politely, superficial and occasionally misleading. Volume 2 can be commended for introducing some advanced material, but Volume 1 is skimpy and sometimes plain wrong. For instance, the ATI user is instructed to "sort the data in a file" with the INDEX command—wrong, wrong, wrong. You sort, as you might expect, by using the SORT command and index with the INDEX command. They're similar but different. ATI's command sequence for leaving *dBASE II* is USE, CLEAR, QUIT. In fact, all you have to do is type the command QUIT. To reorganize data in a file, the ATI manual says the user types DO SEQ, where SEQ apparently stands for sequential. No such *dBASE II* command exists unless you create it using a special program. (ATI says it wrote the manual believing such a command was due to be included in a future version.)

In Volume 2 the section describing the add-on ZIP program that quickly arranges printouts and data entry forms neglects to mention that ZIP doesn't yet exist for PC-DOS. The upshot is that you probably are better off without ATI, at least with Volume 1.

Another entry in the disk derby is a program by Data Processing Educational Corporation (DPEC), an Ohio firm that is moving from mainframe and minicomputer training to micros. *PC* received an advance copy of DPEC's tentatively titled *Computer Based Training for dBASE II*, which might as well be titled *Twenty Questions*. Professional educators may argue that quizzes can reinforce what has been learned, but my gut reaction is: "Enough already." DPEC's tutorial is laced with questions: There are two question screens in the first 10 screens. Correct answers elicit such responses as the misspelled "Dynomite!!!"

Otherwise, the as-yet untitled program is acceptable, though not quite as sophisticated as the one offered by Cdex.

On the whole, the disk tutorials are overwhelming in their lack of recognition of the IBM PC's special-function and cursor-movement keys. Unfortunately, the cassettes and books aren't much better in this respect, either.

Diskette/Cassette Tutorials

All three books may be worth owning even if you purchase a cassette or disk tutorial. Now that Ashton-Tate includes a three-disk tutorial free of charge with *dBASE II*, however, it's tough to recommend paying for another disk tutorial unless it's clearly superior.

The *Ashton-Tate dBASE II On-Disk*

Tutorial is the only disk tutorial that actually runs *dBASE II*. Tutorials by other companies mimic *dBASE II*. Ashton-Tate tutorial is paced faster than the other disk tutorials, but it is not so fast that it leaves the novice behind. Like the manual and like the program itself, the Ashton-Tate tutorial for *dBASE II* seems to reward the user blessed with the right microstuff. The more savvy PC users might pick up concepts 20 percent faster than those who are less experienced.

After listening to the mellow, professional radio voices on most other tutorial cassette tapes, the everyday-guy-at-the-mike voice of the *dBASE II Personal Tutor* cassette training series is both refreshing and jolting. The three tapes,

To Quote or Not to Quote

That is the question. The answer—more often than not—is you're safer if you do.

One of the most confusing procedures for the person just getting started with *dBASE II* is deciding whether some part of a command needs to be enclosed in quotation marks.

The general rule is that more often than not, you do need them for most verbal expressions and even for many numeric expressions. You may enclose the expression in double (") or single (') quotation marks or square brackets ([]). If you use single quotation marks, use the closing mark (') at the beginning and end of the expression.

Suppose we're using a simple name-and-address file, PHONELST in *dBASE II* that is indexed on the last-name field, called LAST:NAME. To find everyone in the last half of the alphabet, enter:

```
DISPLAY ALL FOR last:name
>='N'
```

The greater-than-or-equal-to sign (>=) means, for alphabetical words, "is the same as or comes after" the letter N.

To find everyone who lives in California, near Ashton-Tate, the maker of *dBASE II*, type:

```
DISPLAY ALL FOR zip:code =
'90230'
```

Since ZIP:CODE was probably stored as a character field, what you're looking for isn't really the number 90230, but the characters represented by this number. So it belongs in quotes. Only if ZIP:CODE were a numeric field (not numbers in a character field) would it be ZIP:CODE = 90230.

Although you can't total numbers in a character field (why *would* you want to sum all the zip codes?), you can sort them.

The same rules also apply for most other expressions: SORT ON, LOCATE FOR, DO IF, COPY TO <filename> FOR, and so forth. In each case you must enclose the expressions in quotation marks, unless you're dealing with numbers in numeric fields.

The exceptions to the put-it-in-quotes rule are few: ACCEPT (characters) TO a memory variable, STORE (a number) TO a memory variable, string functions, numbers in a numeric field, and FIND (where quotes are optional). For ACCEPT TO, the proper entry would be,

```
ACCEPT TO pi
:Apple
```

PI is one of *dBASE II*'s 64 memory variable pigeonholes (you give each of them names) and the colon is a prompt telling you to type in material. The above statement stores characters, namely, the word *Apple*.

```
STORE 3.14159 TO pi
```

```
ACCEPT TO pi
:3.14159
```

The first example above stores a number in PI. The second puts in memory ASCII characters that represent the number 3.14159. To enter it as a number that can be multiplied, use the expression VAL(PI).

To find everyone using the index with the same last name as the president's, type:

```
USE phonelst INDEX
last:name
FIND Reagan
DISPLAY
```

Quotation marks don't hurt here either. If you were to tell the computer: FIND 'REAGAN', DISPLAY it would do the same thing. FIND only applies to indexed files; otherwise use LOCATE and enclose the accompanying expression in quotation marks:

```
LOCATE FOR name = 'Reagan'
```

String functions require quotation marks, too. One use of a string is to find information when you only know a fragment, say a long-forgotten friend with a preppy first name: Muffie or Buffy:

```
DISPLAY ALL FOR
'uff'$first:name
```

This will find any occurrence of "uff" in Buffy, Muffy, or Fluffy in the FIRST:NAME field, but not Babs, Bunny, or Binkie. There is only so much *dBASE II* can do. But in general, if you slap quotation marks around the expression, there is a greater chance of being right than wrong. —W.K.H.

offered by Personal Tutor Associates, are marked by pauses as the narrator either searches for his place in the script or mentally composes the next sentence. In the background is the click of the PC keyboard and the occasional buzz-braaap of a dot-matrix printer.

Too much of the first *Personal Tutor* tape is taken up with an explanation of how great *dBASE II* is, interspersed with some asides about how to install the program and the advantages of the latest version (2.4). The program too frequently uses the crutch, "Please stop and review the manual."

Clearly, the people at Personal Tutor Associates know their stuff, but what do they know about communicating to *dBASE II* users? They should have written a book instead, or omitted the asides and pointers from the tape and published them in a companion booklet.

The three tapes run for 101, 97, and 99 minutes, respectively—possibly meriting inclusion in the *Guinness Book of World Records* under "Feats of Wind Power." To get yourself in the right frame of mind, before playing cassette one, hum a few bars of "Ramblin' Man." The company should re-edit its script to three one-hour tapes and hire a professional speaker. Then *Personal Tutor* would be a decent product.

Another *dBASE II* training cassette program is available from Micro Instructional. The company's two tutorials, *dBASE II Tutorial: Beginning* and *dBASE II Tutorial: Advanced*, are adequate. The documentation is an unsophisticated sheaf of program examples stapled together. Much of *dBASE II Advanced* consists of an incredibly complex inventory control program of 13 command and two data files. The one-tape Micro Instructional tutorials run 64 *(dBASE II Tutorial: Beginning)* and 79 minutes *(dBASE II Tutorial: Advanced)*, respectively.

If you have 36 minutes, then you have what it takes to zip through Computer Literacy Training Systems' *dBASE II Cassette Tutorial*. A first-time computer user might feel rushed, but most others will be comfortable with the pace. Obviously, you won't uncover every nook and cranny in *dBASE II* in 36 minutes (Micro Instructional and Personal Tutor Associates do a better job here), but the time is spent productively, permitting you to create, open, close, use, append, and edit files. Also, at $15, or about 42 cents a minute, for the cassette, the price is right.

Another program worth examining is *Using dBASE II* from FlipTrack Learning Systems. It's a series of three or four tapes in the $50 to $65 range and should be on the market by the time you read this.

Actually seeing someone successfully create a simple *dBASE II* database will be an advantage for many users.

Videocassettes and Templates

For more than you would have to pay for many other complete database programs, you can buy a videocassette that shows how to learn *dBASE II*.

To date, the only videocassette on the market is *dBASE II: An Introduction to the Command Language* offered by ANDERSON SOFT-TEACH. It runs 42 minutes and costs $195. The videocassette teaches fundamentals and builds confidence. Actually seeing someone successfully create and use a simple *dBASE II* database will be an advantage for many users. The video quality is good, except for some close-ups of the screen display. The best future video tutorials will electronically record the screen display, rather than photograph the screen, to avoid the problem of poor image resolution.

Two companies offer templates that wrap around a PC or PC-clone keyboard: the PC-DocuMate 200 by Systems Management Associates and the Kleertex dBASE II. Both products are equally good, and both are double-sided. They cover essentially the same material as the 8½-by-22-inch *dBASE II Command and Reference Guide* that comes with the program. The Kleertex includes an additional small command card to fit material that didn't get on the main template.

The PC-DocuMate has better typography, is better organized, and is cheaper. The Kleertex appears to cover more material. Neither is as convenient as a single-sided template for a reason that's almost too obvious—it's the flip side of a two-sided template that always has the command you're looking for. For a program as complex as *dBASE II*, however, a two-sided template is unavoidable.

Although *dBASE II* can't be learned in an hour as some tutorials claim, you can acquire a good sense of how the program works—and of your ability to use it—in an evening. All the training guides help, but to varying degrees.

Certainly, you should buy one of the aftermarket books, probably Adam Green's. The Ashton-Tate disk tutorial is quite good—especially since it comes with current *dBASE II* programs. Otherwise, the choice is Cdex, which is probably the most polished disk tutorial of all. DELTAK's disk is good but overpriced; DPEC has potential if the final release allows the user to skip the profusion of quizzes; and ATI builds confidence quickly but only by glossing over the topics.

No currently available cassette tutorial is first class. Personal Tutor is thorough, if a little strange, Micro Instructional is fair to good, and Computer Literacy Training is as good as you can expect from 36 minutes.

The ANDERSON SOFT-TEACH videocassette is a sensible choice to teach the program to an office staff. It's too expensive for one person, probably. With one or more of these learning aids, mastery of *dBASE II* is just around the corner. ■

MITCHELL LYNCH

The Wizardry Of Ashton-Tate

George Tate's marketing savvy has been the major driving force in dBASE II's—and his company's—phenomenal success story.

Photograph: Roger Ressmeyer

Ask George Tate how, at age 40, he became a multi-millionaire and how a computer software package called *dBASE II* made him so rich, and without hesitating, he'll reply, "You've got to love what you're doing."

Coming from most other people, that kind of answer would be pure hokum, but Tate is dead serious. His Southern Evangelism laced with hucksterism has been an important ingredient in the meteoric success of *dBASE II* and of his company, Ashton-Tate.

Even in the fast-paced computer-product business, where companies spring up overnight and begin flourishing the next day (and many fail equally quickly), the growth of Ashton-Tate is considered remarkable.

Since it was formed in August 1980, Ashton-Tate's sales have grown tremendously. For the fiscal year ending January 31, 1984, sales are estimated to be well over $30 million. For the first 6 months of that fiscal year, Ashton-Tate's sales totaled $14.9 million and profits were a robust $2.7 million.

Unlike other computer company rags to riches tales, Ashton-Tate's story is less one of technological brilliance than it is one of marketing razzmatazz. It is, in large part, George Tate's story.

A Born Tinkerer

Tate was born in Tennessee and raised in South Carolina. Much to the consternation of his father, who had graduated from college Phi Beta Kappa, young George decided to drop out of high school at age 16. "It broke my father's heart," he recalls. "He couldn't figure how anyone could turn down a chance for a college education."

Always something of a tinkerer, Tate was earning money as a television and radio repairman by the time he was 14 years old. "I liked to take things apart and look inside," he says. Tate eventually joined the Air Force, where he spent some time "reading up" on technology. After his service, he returned to working as a TV repairman, but in Atlanta. In 1973, Tate decided to move to the West Coast to ply his trade. Two years later, he launched his computer career by ordering a kit to build the Altair, one of the first microprocessors. "I just loved it," he says. He decided he wanted to be a computer repairman. Meanwhile, he joined the Southern California Computer Society where he met Hal Lashlee, an accountant.

In early 1980, after seeing go-go computer companies springing up all over the Los Angeles area, Tate and Lashlee formed their own mail order software house, which they called Software Plus. As Tate saw it, the software business at the time was "cold and hard," essentially selling junk and providing few followup services. Tate and Lashlee operated differently; they offered discounts, fast delivery, and full support services, including a toll-free telephone number. The company soon began to bring in sales of more than $100,000 a month in software.

> The software business at the time was "cold and hard," essentially selling junk and providing few followup services.

In the summer of 1980, Tate and Lashlee heard about a software product called *Vulcan*, developed by W. Wayne Ratliff, an engineer at the National Aeronautics and Space Administration's Jet Propulsion Laboratory in Pasadena, California. *Vulcan* was a database package, considered by many to be far ahead of competing products. At first, Ratliff tried to market *Vulcan* himself through advertising in computer magazines, but he didn't have time to respond to all the inquiries. When Tate and Lashlee contacted Ratliff, he was glad to sell them exclusive rights to the *Vulcan* package. Then they faced their biggest challenge: marketing the product.

On the theory that a new business should "get an advertising company that charges more than it can afford," Tate and Lashlee hired Hal Pawluk of Abert, Newhoff, and Burr, a prominent Los Angeles firm. "Those guys called me a half-dozen times before I finally went over to their place," Pawluk says. "I just didn't think they could afford big-time advertising."

Advertising Pays

Although impressed after trying out the *Vulcan* software, Pawluk decided the name had to be changed. He came up with *dBASE II*. Why? "It was Britishy, and with the small 'd' and capital letters, it looked good in type." There never was a *dBASE I*, Pawluk adds, but "the 'II' implied an improvement." Pawluk also renamed Software Plus, which he called Ashton-Tate, foregoing the name Lashlee, he says, because "it just didn't sound right."

The boldest stroke came with Ashton-Tate's very first national magazine advertisement. Innocuously enough, the headline read "*dBASE II* vs. The Bilge Pump." Then it went on to say: "We all know that bilge pumps suck, and by now, we have found out—the hard way—that a lot of software seems to work the same way." The ad was the only one Pawluk signed himself. The response was thumping and included some nasty calls from the maker of the bilge pump pictured in the ad. Tate laughs. "I told them we'd pay for an ad saying their pump didn't suck."

"You have to realize," Pawluk explains, "that in those days the audience was different. Mostly computer people bought the software, people who knew a lot about what makes a computer run. The noise level in the computer business was pretty high; you had to grab their attention."

As crazy as they were, Tate went along

(continued)

Changing of the Guard at Ashton-Tate

Ashton-Tate's entrepreneurial chief executive steps aside for a young management professional.

To hear him today, you'd think that George Tate's decision to quit school at age 16 was his chief qualification for running Ashton-Tate. "If you don't get educated, then you have to figure things out for yourself," he says. "You don't need a college education to figure out what a customer wants, what he needs, and why he's going to buy one thing and not another. You want to know what a customer wants, all you got to do is ask him."

This seat-of-the-pants management philosophy makes even more surprising Tate's "textbook" decision last summer to hand on his chief executive officer's title to a young professional manager.

Tate Steps Down

"One day I realized this was getting out of hand," Tate explains. "I knew we just no longer were a seat-of-the-pants kind of company. We'd gotten big." Tate says that after looking through the books and seeing Ashton-Tate's roaring sales, its rising production and sales costs, and its growing employee roster (more than 250 by mid-summer), he decided he should leave the helm. "It was time for me to move on," says Tate.

Many management experts consider Ashton-Tate a prime example of a high-tech company that is moving smoothly through three key management phases. First, it is run by the engineer-scientist who develops the basic product, then by entrepreneurs who market the product, and finally by a professional manager who takes over as the highflier matures.

Ashton-Tate's professional manager is David Cole, 31, a graduate of the University of Hawaii who later dropped out of law school to go into the business of studying corporations and management. Before joining Ashton-Tate in 1982, Cole's key areas were product management and planning, advertising, promotion and market research. He was an executive at CBS at the time that it was expanding its publication group. Later, he joined Prentice-Hall as the publisher was expanding into books on computer science and engineering. When he met George Tate and his partner, Hal Lashlee, in 1981, Cole headed his own management consulting company on the West Coast.

Cole joined Ashton-Tate in February 1982, as president, and later acquired 770,000 shares of company stock, 170,000 of which he sold in the November, 1983 public offering.

A Management Transition

The easy management transition at Ashton-Tate is quite unusual. Many high-tech companies run into trouble when management in either of the first two phases balks at yielding power to the next. If, for example, the engineers stay in charge too long, the company winds up with a superior product but is beat out by competitors with better marketing programs. If the entrepreneurs fail to move aside at the right time, the company suddenly finds itself stretched too far without the needed controls on production, sales, and distribution. The entrepreneurs don't know enough about running a big corporation, expanding its manufacturing and distribution, or diversifying its product line. The company collapses.

By the time Cole arrived at Ashton-Tate, some slackness was, in fact, evident. In both 1981 and 1982, for instance, the company spent no money on research and development; instead, the money went to Ratliff in the form of royalty payments. Ratliff has since agreed to a full-settlement payment and joined Ashton-Tate as vice president of new technology.

In the last year, Ashton-Tate has brought out a line of follow-on products. They include *Friday!*, a more finely tuned database package (named for Robinson Crusoe's servant, Friday); *dBRUN*, designed to help programmers write and distribute professional applications using *dBASE II* as a language; and *Financial Planner*, an accounting package.

Ashton-Tate has also recently expanded its sales network to more than a dozen other countries and has instituted a national accounts program for big commercial and industrial customers. It has worked out distribution agreements with CompuPro, Hewlett-Packard, Shasta General Systems, and in Japan, Toshiba.

Despite these changes, Ashton-Tate maintains what it calls a strong customer relations program, featuring a hotline, subscriptions to a monthly newsletter called *dNEWS*, and an "Express Support Package" offering discounts on future products.

And Tate still sounds more like an "aw-shucks" country preacher than like a man whose success story will give management theory experts material for years to come. "We didn't have any ideas of making a million dollars when we started out on this, honest," he says. "People here at Ashton-Tate just love what they're doing. Why, I honestly love to get up in the morning to go to work. The way to make it in this business is to treat your customers like real human beings." —M.L.

with Pawluk's ads and ideas because they drew attention to *dBASE II*. And in 1982, Tate came up with the idea to float a helium-filled blimp labeled *"dBASE II"* through a Las Vegas computer exposition. "They made us bring it down after awhile," Pawluk says.

Sweet Success

All the hooplah has paid off for Ashton-Tate. So far, since shipments began in January 1981, the company has sold more than 140,000 copies of *dBASE II*, which retail for around $700 each. The company has expanded its product line, its sales network, and its distribution system, which has become more sophisticated and international.

Today, Tate likes to say, he has been vindicated in his father's eyes. Since Ashton-Tate went public in November, his net worth can be figured at $50 million easily. Of that 1.7-million-share common stock offering, 215,000 shares were Tate's, and another 215,000 Lashlee's. The stock went for an average price of $14 per share, leaving each man with a hefty $3-million chunk of cash. Each man still owns more than 3 million shares of the outstanding stock, retaining 34 and 35 percent, respectively.

The offering has also made others associated with the enterprise wealthy men. One is Wayne Ratliff, who signed on with Ashton-Tate as a vice president in August 1983, selling his interest in *dBASE II* for $150,000 in cash, $2.1 million worth of Ashton-Tate common stock, and a $6.35 million promissory note. Another is 31-year-old David Cole, who took over from Tate last summer as Ashton-Tate's new chief executive officer (see sidebar).

Pawluk claims that Tate's marketing savvy is the real secret of Ashton-Tate's success. "Most guys —the technicians — spend all their time looking in at their equipment," he says. "George Tate is one of the few guys who knows how to look out from the machines at the market."

One of the hallmarks of the Ashton-Tate method, Tate says, is to keep giving questionnaires to customers and other computer users "to find out what they really want in a product." He adds: "That's what some places forget to do, you know. They lose touch with what they're doing and selling, and they forget all about the customer." ■

Mitchell Lynch is a Boston-based business writer. Before striking out on his own, he was a reporter for the Wall Street Journal.

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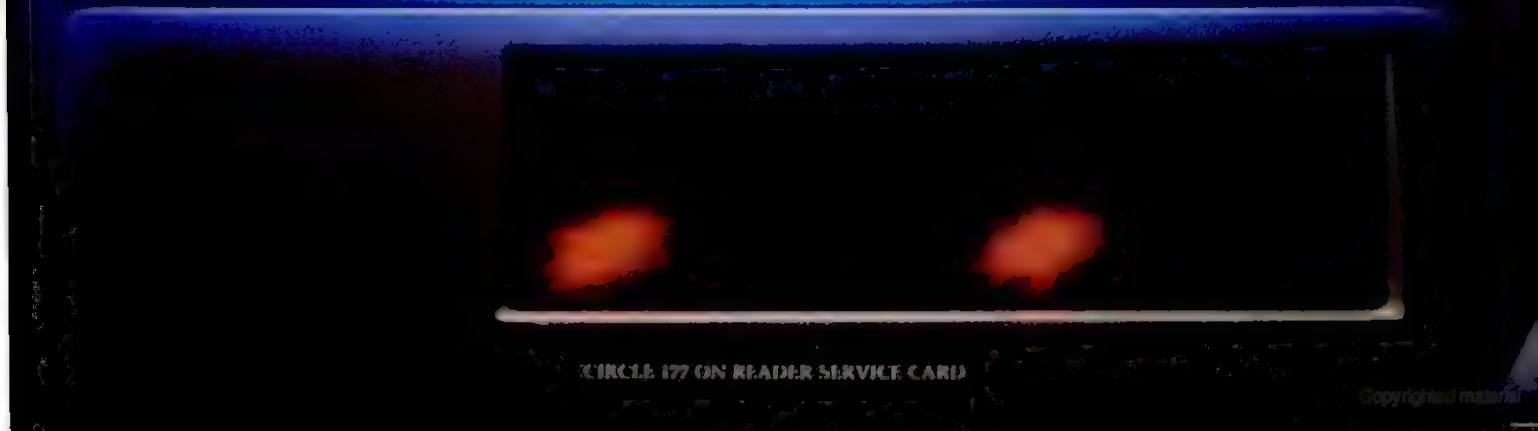

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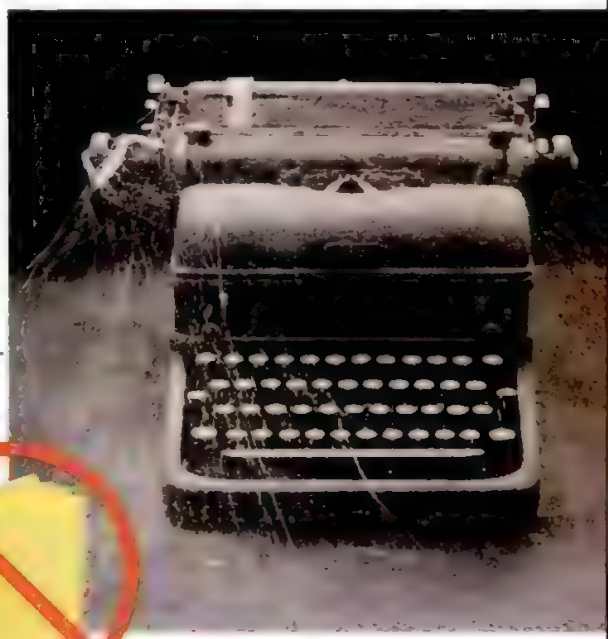

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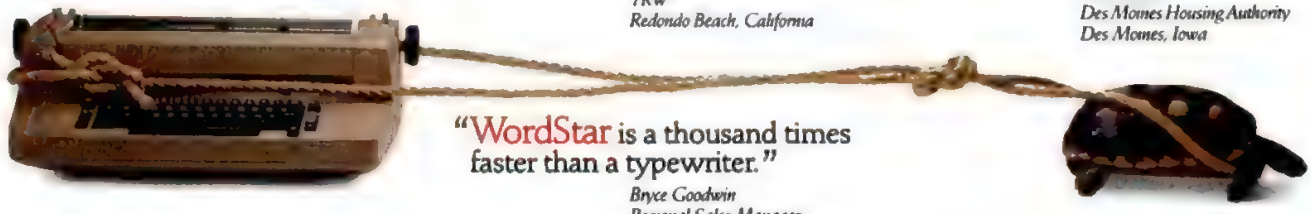

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Three Days With dBASE II

Adam Green's groupies flock to hear him lecture at seminars across the country. What really goes on at these dBASE II marathons? Here's the inside scoop.

As I sat down to lunch, the man taking a seat on my left inquired, "Y'all using *dBASE II*?" He explained that he had come to Chicago from a small hospital in Arkansas that planned to handle all of its records with *dBASE II*. Dwight, at the same table, was also from a hospital, in Ashtabula, Ohio. He had been using *dBASE II* for some time as director of data processing, but recent changes in Medicare have meant that he must learn to use a much more advanced application.

Later that day, as I settled into the SoftwareBanc *dBASE II* seminar at Chicago's Hyatt Hotel, I met Kim, who worked at a money management firm in Minnesota (she wasn't managing very well with any of the available accounting packages and hoped for help from *dBASE II*), Joe from Monsanto Company in Connecticut (implementing *dBASE II* in the areas of office automation, purchasing, and new product development), Kathleen, a market analyst with General Electric in Milwaukee by day and an MBA candidate by night (she

Adam Green

was looking to refine specific aspects of her *dBASE II* applications), and James, struggling with many megabytes of university data on a micro somewhere in Illinois.

All of these people had come to spend 3 days learning about *dBASE II* from Adam Green. I was unique in this group because I was there instead to report on what it is like to learn about *dBASE II* in such a concentrated manner.

The Guru of dBASE II

It is probably safe to say that no one knows as well as Adam Green how you can make *dBASE II* work for you. Besides his enthusiasm for the subject, he has an actor's instincts, which, combined with his considerable teaching ability, turns each of his classes into a command performance.

Most importantly, Green knows *dBASE II* in extraordinary detail, and he is able to convey a sense of its personality. Green's expertise stems from his own company's extensive use of the product and his close association with *dBASE II* from its infancy. He was product manager at a chain of computer stores in Massachusetts in 1981 when he started to work intensively with *dBASE II*. Green's disk serial number indicates that he was one of the first hundred people to purchase the program.

Between June and November of 1981, Green taught over a dozen *dBASE II* classes for his company. After a few hours of his instruction, prospective customers would typically purchase a $10,000–$70,000 computer system. Realizing the potential market for software but unable to find a single company in New England that was more interested in selling software than hardware, Green decided to set up his own Company, SoftwareBanc. He continued to teach classes in Boston, frequently addressed user groups, and published his first *dBASE II* book, *The dBASE II User's Guide*.

The mailing list for this book provided an excellent database for setting up a teaching itinerary. Green's itinerary currently includes Chicago, New York, San Diego, Dallas, Washington, Orlando, and a few other cities. Participants register through SoftwareBanc (800-451-2502) at least 3 weeks ahead and pay in advance. Each seminar includes 3 days of *dBASE II* classes covering the topics of Fundamentals, Programming, and Advanced Programming.

Green was one of the first hundred people to purchase the program.

Who Needs It?

It isn't easy to become fluent in *dBASE II* on your own. The program is not menu-driven, nor is it user-friendly in the sense of protecting users from themselves; it is instead command-driven. It is a programming language (originally developed for database creation and management) with a syntax that must be learned, but the learning experience pays off right from the start. Becoming familiar with *dBASE II* development tools, Green emphasizes, gives you the power and control to make the system do exactly what you want it to.

Because there are no menus and the user manual is opaque, the key is training: learning the potential for continuous enhancement, avoiding the pitfalls, and minimizing the frustrations. The strategies can be absorbed almost painlessly from a self-taught *dBASE II* guru like Adam Green.

The seminars attract a certain clientele. The students are not primarily data entry personnel or vice presidents, but middle-level decision makers who are in charge of a department or about to computerize one, and programmers. Green is aware that many of the managerial people who attend his seminars will go back to their corporations to train others. He recommends at the outset that the more experienced members of the audience should not tune him out during discussions of the fundamentals. "You will become the full-time, unpaid trainers of *dBASE II* in your corporations" he says. "I've been teaching *dBASE II* for 3 years and I have good analogies for the basic concepts."

Green tells his classes that there are two kinds of people: programmers and human beings. The popularity of his seminar can be credited, at least partially, to the fact that it effectively addresses these two "extremes" in human nature. You can detect the hand of a meticulous programmer in Green's detailed presentation of the intricacies of *dBASE II*. Human values permeate the lessons in programming and also extend to the carefully constructed break schedules and lunch menus that Green has devised to get his students through 3 intensive days of 9-to-5 classes.

In addition to the meals, Green controls the lighting, the temperature, the time of each break, the touch of music, and the exact amount of extra space required in every room to make people feel comfortable. His object is to create the right atmosphere for learning.

Hands Off Approach

Green begins the first session with a warning: "*dBASE II* does nothing for you. It doesn't automatically update a database index, it will let you overwrite a file, it keeps track of nothing for you, and it does so consistently."

Many attendees are surprised to find that it's not a hands-on seminar. They

soon realize, however, that the rapidity and intensity with which Green conveys information would make such an arrangement impractical. With machines in front of them, Green points out, people are distracted by their own syntax errors or the failure of a disk to boot. "It reduces the bandwidth—the amount of information I can convey over a period of time," he says.

Instead, he makes good use of a big-screen projector. Part of the time he uses it to show an edited selection of videotaped interviews with *dBASE II* celebrities but it is usually connected to his computer, a Compaq, and it reflects the keyboard input so the class can watch the development and variations of programs as if they were doing the examples themselves. A second screen with a simple overhead projector is used to show slide versions of class notes, including an outline of the topic currently under discussion, *dBASE II* programs, and database diagrams. The slides continually reinforce the information models and concepts.

Green offers useful hints on everything from hardware (how to make sure your software efforts are hardware independent to keep your data safe from hardware obsolescence) to insights on office politics. During the first day of classes, we learned the basics of *dBASE II* and the source of its wide appeal.

Writing applications can be very fast; while it is not as fast in execution as COBOL or PL/1, it is terrific is you need an inventory application done yesterday. A lot of the dirty work has already been done by the developers of *dBASE II:* disk file management, forms management, indexing (it normally takes less than 2 seconds to find any record if you know the key), and the query language (you can ask ad hoc questions of the dot).

What makes *dBASE II* so easy for people, programmers, and other programs to work with is that each file header contains a self-documenting structure of the file. Partly because it is so easy to share information with *dBASE II*, the language is becoming a de facto data standard. For example, one version of C language has been given the ability to read *dBASE II* files.

The Instant Expert

By the middle of the first day, I had become familiar with enough information and commands (USE, CREATE, EDIT, LIST, APPEND, DELETE) to set up and manage a database, and I had seen a good demonstration of the power of the REPLACE ALL command. By the end of the day I could discuss at length the advantages and disadvantages of indexing over sorting. I had been duly impressed with the importance of the record pointer, and had picked up that leading zeroes would give part numbers numeric order in a character field. I knew how to extract things of practical and imaginative interest from an ordinary mail file by listing for conditions. I had learned the difference between DBF, NDX, MEM, FRM, and TXT files, and that setting ALTERNATE ON would give me a text file that could be accessed by other programs and generally enable me to do more useful work.

I knew how to extract things of practical and imaginative interest from an ordinary mail file.

On the second day Green really got going, and the amount of information he conveyed seemed to increase geometrically. The third day was still more intense.

I learned how it was possible to find out "the amount on hand" of a certain inventory item by merely knowing a customer code. I knew, in essence, that if two files had a value in common there was a relationship between them. The methodology to call up that relationship rang in my brain like a magical incantation: ". . . leave the primary file, change the secondary file, find the matching record, take the next linking value, put it in memory, use the third file, take that linking value and put it in memory...."

Much of the highly technical discussions on the second and third days were devoted to building programs to protect data. Although Green is an expert at this, he is not philosophically in favor of these techniques. "It's a question of control. Talking to *dBASE II* is a lot like talking to a person and being able to tell that person what to do. Programmers go too far when they send the user along a path through a maze like a mouse."

Rapid Movement

Green assesses his audience at the start of each day, and because of the advanced level of experience the classes proceeded rapidly. The information he puts across becomes increasingly condensed and complex with each day, although he continues to reiterate the main themes in each separate context. After 3 days of continuous instruction I was slightly overwhelmed, to say the least.

I was at a disadvantage from the beginning because the others at the seminar already were fluent with the language. But I was open-minded and enthusiastic about the prospect of learning a completely new subject. Due to the structured nature of Green's approach and some tenacity of my own, I was always able to follow a thread and to pick up the main points, whether technical or general.

Someday I will undoubtedly need to build a database, and when that day comes I will be able to do it. I will know many of the pitfalls, obstacles, and possibilities, and when I run into difficulty and take a look at my notes, they will bring back to me, with amazing clarity, the words of Adam Green. ■

Leslie Miner has worked as a TV journalist in England and frequently writes about computers and science.

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Advice From The Master On Learning dBASE II

Computer-education pioneer Adam Green blazes a trail through the blackboard jungle to show you how to find the dBASE II class that's right for you.

Open any major newspaper to the business section and you're bound to get the impression that there are more people teaching *dBASE II* than using it. I'm often asked, "if *dBASE II* is so good, why do I have to take a class just to use it?" I've taught *dBASE II* to over 5,000 people, and I always answer, "You don't have to take a class, but you'll be glad you did."

Just as *VisiCalc* first attracted accountants to microcomputers, *dBASE II* has proven to the data processing world that microcomputers can be valuable tools. Many users treat *dBASE II* as a file manager appropriate for simple mailing list management, but this is like buying a Ferrari to drive to the supermarket. The power of *dBASE II* lies in its programming language, which provides the capability to handle almost any business application.

The catch is that this powerful language can take anywhere from a week to several months to master, depending on one's computer-background. A properly taught class can greatly reduce this learning time.

But there is no such thing as the perfect *dBASE II* class. Everyone needs something different from a *dBASE II* class, and no one class can possibly satisfy everyone's needs. If you're looking for a class, or even thinking of teaching one, there are several factors you need to think about to make sure you get the most out of the experience.

Who Should Attend

I find that microcomputer owners fall into three groups. I call these groups pioneers, decision makers, and the masses.

Pioneers are the ones who bore everybody at lunches and parties by talking about the latest software they just bought. They always know what the next IBM PC will look like and how to find the bugs in PC-DOS. Being a microcomputer pioneer has suddenly become a corporate status symbol, and the competition to be the most knowledgeable about an important program can be intense.

If you are a pioneer, you don't need an introductory class in *dBASE II*, and even if you did, you wouldn't admit it. But you can gain a great deal from a class slanted towards tips and techniques. Even if you could figure it all out by yourself, why re-invent the wheel.

Decision makers are typically managers in charge of choosing the right soft-

ware for their company, department, or project. They don't actually use *dBASE II*, but they must know enough to talk intelligently with the programmers. If you're a decision maker, you'll benefit most from classes stressing basic concepts and terminology. You need to know the limitations of *dBASE II*, in order to determine if the program will be able to handle your particular applications.

The masses are those who actually use *dBASE II* in their work. They are either programmers or data-entry people. Unfortunately, because of their high turnover rate, data-entry operators are rarely given training in *dBASE II*. That's too bad, because in my experience, computer training can be so motivating that turnover is reduced, and productivity increased. A hands-on class with heavy emphasis on concepts and commonly used commands is best suited for data-entry personnel. Programmers, like the pioneers, should attend a class that covers tips and techniques that could take them a long time to discover independently.

Where To Go

One common source of *dBASE II* classes is your local computer club. If your city doesn't have a *dBASE II* user group, the local IBM PC club probably has a *dBASE II* special interest group. These classes are often taught by local consultants and are also an excellent place to look for free-lance programmers. Before enrolling in one of these classes, be sure to ask about the level of computer background being assumed. User groups sometimes become dominated by the more knowledgeable members. Pioneers and programmers will probably feel right at home, but data-entry staff and decision makers might not get the basic conceptual foundation they need.

dBASE II has become so well-accepted by data processing people that several university computer science departments are now offering classes. A major advantage of these courses is that they are taught by experienced teachers. If the class is offered during the day, it is probably aimed at programmers; evening classes are usually designed for busy decision makers who work during the day.

Computer stores have finally realized that instead of giving away technical support they can actually sell it. ComputerLand, for example, now requires all new franchises to provide space for in-store training. While store-run classes may not provide decision makers with an unbiased view of *dBASE II*'s limitations, data-entry people would probably receive a good introduction to the basic commands from one of these courses. Based on my experience with retail salespeople, it is doubtful that computer-store classes will be rigorous enough to satisfy pioneers and programmers.

> The competition to be the most knowledgeable about an important program can be intense.

Companies specializing in computer training are now springing up around the country. They usually hold classes for several days at a time in major hotels or at a company's office. Decision makers are the most common targets of these classes, but pioneers and programmers can get a great deal out of them if they avoid the earlier, conceptual sessions and attend only the later sessions. Since these classes are taught by professional educators, the quality of presentation is likely to be quite high. The price is also likely to be high, so these classes may be inapropriate for data-entry personnel.

What to Look For

After you decide what kind of *dBASE II* class you want to take, you should try to find out what the class covers, how it will be taught, and something about the instructor.

I like to start my *dBASE II* classes with the history of the program. Attendees should know that *dBASE II* is still evolving. Wayne Ratliff, the author of *dBASE II*, did not carve the design onto stone tablets. Instead, he helped it grow over time to meet the needs of its users. An understanding of the history of *dBASE II* is interesting in an academic sense, and it is important to the decision makers who must evaluate the long-range viability of the program before they commit their company's resources.

Another important piece of information to look for is an explanation of *dBASE II*'s personality. A computer is a machine, and most people fail to recognize that when they use a large program such as *dBASE II*, they are really talking to the author of the program. Just like a person, *dBASE II* has quirks and idiosyncrasies, knowledge of which can be vital to understanding the program.

One reason many people have problems learning to use *dBASE II* is that they lack a physical model of the program's operation. Users of word processing software have an intuitive model of a large scroll of paper inside the computer. Designers of word processors reinforce this physical model by using terms such as cut-and-paste for moving blocks of text. The best model for a *dBASE II* data file is a paper table of information. Each record in the file is a row in the table, and each field can be thought of as a column. Any introductory class on *dBASE II* should apply all new commands to this physical model.

Of course, it is important for you to evaluate the teaching style and expertise of the instructor. An instructor who has been an active *dBASE II* programmer for at least a year is a must for pioneers and programmers seeking a heavy emphasis on tips and techniques. Another thing to look for in an instructor is honesty about limitations and bugs. All software has bugs, and *dBASE II* is no exception. But bugs aren't really that bad, as long as you know where they are.

Food for Thought

According to Adam Green, equipment, diet, and the physical environment can play an important role in the learning process.

The success of a *dBASE II* class can be determined before the instructor says a word. In addition to the quality of the presentation, external physical factors, such as the food attendees have consumed during the day, room ventilation, and special equipment play important roles. A major goal of any class should be to create a total environment conducive to learning.

When I teach private *dBASE II* classes for large corporations, I'm often shocked at the total lack of ventilation in so-called training rooms. It's a scientific fact that 50 people in a room without recycled air will fall asleep within 15 minutes. Besides providing air-conditioning, another way to keep the air quality high is to forbid smoking.

Closely related to air quality is room temperature. I have found that a slightly cool room tends to keep people more alert. (The only problem is that more women than men are bothered by low temperatures.) Don't be surprised, however, if about 30 minutes after lunch the room temperature and humidity start to rise. This is to be expected. As soon as everyone is through digesting, the temperature will return to normal.

Certain teaching principles can also help keep students alert and interested. One such principle is Keep It Simple, Stupid, (Kiss). This means that examples should be stripped of superfluous details. I prefer examples from generic applications such as mailing lists. Instructors often become so bogged down in application details that the concept or command in question becomes obscured. An exception to this rule is a class exclusively for date-entry staff, who often want examples of the actual work they will be performing.

The quality of a lecture can also be improved with the proper audio-visual equipment. There are many systems that can project a computer display onto a large screen. I teach with an Aquastar projector, which displays a live signal from a Compaq computer onto a 10-foot diagonal screen. I also use an overhead projector for class notes. One trick to improve the computer display is to switch the Compaq into the 40-column mode. This makes the characters easily readable up to 50 feet from the screen. The addition of a wireless microphone and portable sound system can make attendees feel as if they're standing right next to the lecturer. This type of presentation system provides the "see what is really happening" benefits of a hands-on class, while allowing the attendees to avoid typing every example.

> A major goal of any class should be to create a total environment

Another important factor affecting the quality of a lecture is information density. This is the number of unique items of information mentioned per minute. Complicating the problem of maintaining an acceptable information density is the fact that people can absorb different amounts of information throughout the day. A major factor affecting attention span is age. Younger attendees seem to reach a peak attention level slowly, but can maintain it for a long period of time. Older attendees tend to peak after the second cup of coffee, but lose interest soon after lunch. That's a good time for a question-and-answer period or possibly a recap of the morning's discussion.

If the class is going to last the entire day, careful attention should be given to the food offered at breaks and lunch. The coffee and crumb cakes served at refreshment breaks create a dangerous sugar-caffeine cycle. If you consume two cups of coffee and a sugar-coated cake before the class begins, the quick influx of sugar and caffeine will give you a temporary lift. But by the time the second break rolls around, the sugar has been forced out of your system and your body craves another cup of coffee and a piece of cake. If this cycle is repeated every few hours, your energy level will be depleted and you'll have a headache before the class is over.

An astute instructor should provide some form of protein and carbohydrates at the breaks, such as yogurt, cheese, or fresh fruit. These foods cause a much slower burn of calories and prevent a sugar rush. Milk and fruit juice can also help break the caffeine cycle. If this makes me sound like your mother, it's only because I want what's best for you.

There are other physical factors that can help create a positive learning environment. When I teach, I have music sent over the sound system during the breaks and make sure that the lights in both the lecture room and lunch area are kept at the same level. Though subtle, these details give attendees the feeling that they are in a well-controlled environment. —A.G.

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Hands-on format classes are a good idea for data-entry personnel who need supervised practice on their particular application. To allow adequate practice time, there ought to be a machine for every two attendees. Decision makers without computer experience might also benefit from this type of presentation, but they should consider getting a hands-on introduction to computers first.

> One reason many people have problems learning to use dBASE II is that they lack a physical model of the programs operation.

The major drawback to hands-on classes is that they greatly increase the information density of the class. The attendees are so busy with the details of typing and dealing with hardware problems that they absorb less information about *dBASE II*. Decision makers who know about computers, pioneers, and programmers will be better served by a lecture format.

Conclusion

I hope I have given you some firm guidelines for evaluating potential *dBASE II* classes. With all the choices available, you should be able to find a class that fills the bill for you. If the process seems more complicated than it's worth, think of the time and energy saved by learning how to use *dBASE II*. ■

Adam B. Green is the chairman of SoftwareBanc, Inc., a software distributor and seminar company. He is the author of the dBASE II User's Guide, *and he teaches* dBASE II *classes around the country.*

Before you turn the page, put this magazine down and pat yourself on the back.

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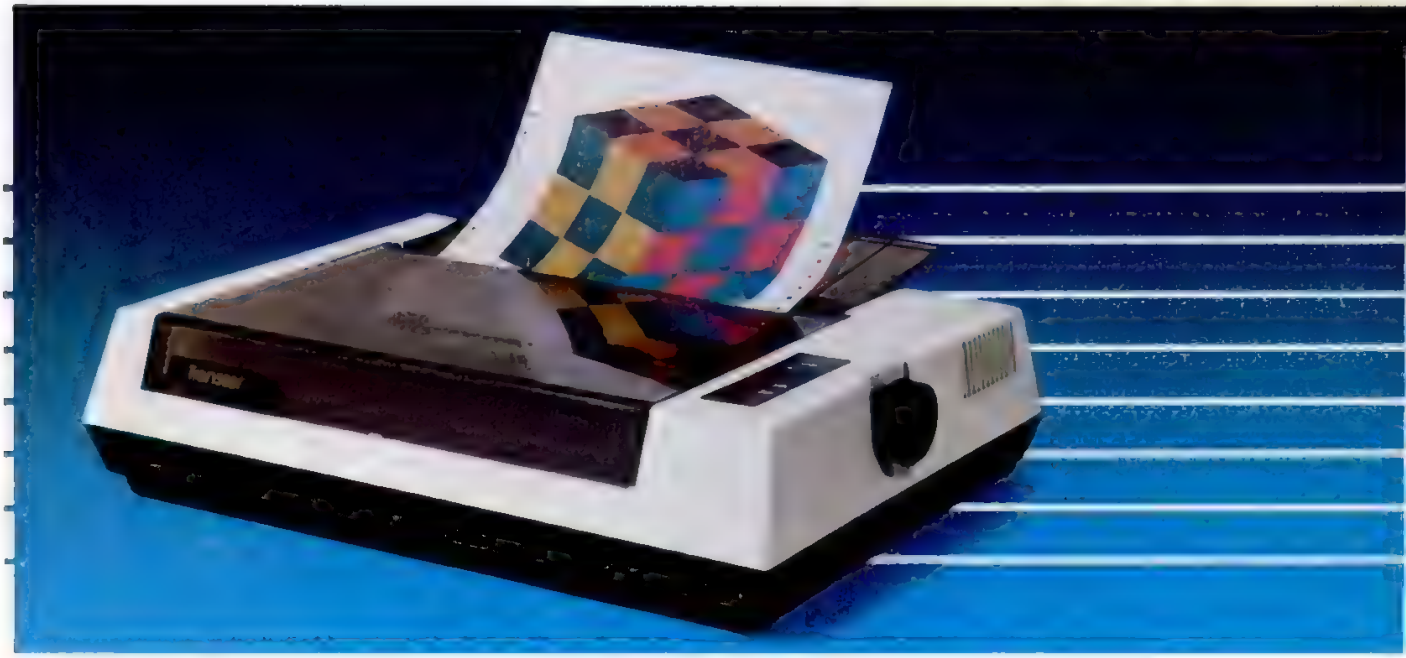

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Just when you thought it was safe to sink your hard-earned bucks into a word processing program, wouldn't you know someone would come along and throw a monkey wrench into the works? NBI, a manufacturer of dedicated word processors that has kept word crunchers busy for the past decade, now offers a taste of this dedicated world to IBM PC users.

This PC version, known simply as *NBI Word Processing for the IBM PC*, was originally marketed as the software to NBI's dedicated system known as *Docuwriter*, a streamlined version of NBI's main document-oriented word processing programs.

The NBI package includes three master diskettes (utility I, utility II, and a word processing and training diskette), two manuals (the *Training Guide* and the *Reference Guide*), and an NBI printed circuit board. The board includes 64K memory, expandable to 192, and a Motorola 6800 processor. NBI believes that this 8-bit processor is the key to the successful transfer of the program from its own 6800-based hardware to the PC. According to the company, the 8-bit processor has enabled NBI to produce a program that is essentially new to PC users but has the benefit of years of debugging through extensive field use. And for the most part, NBI has succeeded. It is refreshing to see a new word processing program that works the way the manufacturer says it will.

Because the program was initially written for the 6800 with a maximum memory access of 64K, it relies heavily on overlays to achieve its full-featured status. With its limited memory, the program spends quite a bit of time reading and writing text and program routines for word processing functions. This means the program's flow will seem a little slow, and you'll find your 5¼-inch drives working pretty hard to keep up with your commands.

NBI Word Processing for the IBM PC
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Boulder, CO 80301
(303) 444-5710
List Price: $695
Requires: 64K RAM, PC-DOS 1.1, one disk drive.

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The *NBI* runs on a minimum of 64K system memory (excluding the memory on the NBI board). It also requires PC-DOS 1.1, a monochrome display, and at least one single-sided disk drive. A graphics monitor will work, too, but screen attributes will differ a little from those described in the documentation.

Installing the NBI board was straightforward and simple, needing only a hex driver and screwdriver. The board fits snugly into any free PC expansion slot and fastens to the back of the chassis with the hex screw (see Figure 1). Appendix D, in the back of the *Training Guide*, covers the entire procedure and provides complete information on determining the IBM motherboard dip switch settings and positions of the NBI board switches. The switch settings are even diagrammed, which helps to ease the apprehension do-it-yourselfers sometimes experience.

Before looking at some of the features of the *NBI*, it is important to note that in this program text files are called documents and are stored in the program's own code. A PC conversion utility program allows you to transfer very basic files back and forth between ASCII and NBI code, if necessary.

A word of warning: If you are used to a program such as *WordStar* that automatically backs up your files, don't look for this feature in the *NBI*. Revisions to documents are made immediately, so the old form of the document is overwritten. On the plus side, text is written to disk about once a page. So, on the average, the most you could lose is about a half a page of copy should there be a system problem such as a loss of power.

Assigning the Keys

As for the word processor itself, I found its operation friendly and comfortable. In the streamlining process, NBI has chosen practical functions, which can be accessed directly and painlessly. The keyboard is used efficiently; almost all of the commands and features can be called from a function key or in combination with either the Alt key or the Ctrl key.

Of all the functions I worked with on the system, basic editing proved to be the most delightful. NBI actually took a look at the IBM PC keyboard before assigning keys to the functions. All of the labeled keys the program uses are truly representative of their functions (see Figure 2). For instance, depressing the backspace key removes the character to the left of the cursor and moves the remainder of the line to the left—just as it's supposed to. The delete key actually deletes; characters at the cursor position are removed, and the remainder of the line moves to the left.

> You can madly replace words without worrying about destroying text.

The cursor-movement keys also correspond closely to their marked symbols. The End key moves the cursor to the end of the line; the Home key moves the cursor to the beginning of the line. PgUp scrolls the screen up or to the previous page (not the previous screen); PgDn scrolls down to the next page. If you have done any BASIC programming on the PC, you will be familiar with using the Ctrl key plus the left or right cursor key to move to the next word in the direction of the arrow. Pressing Ctrl-Home puts the cursor on the first character of the first line on the screen. Those who aren't familiar with these commands will find them convenient combinations to use.

Deletions by word and line are initiated by pressing the Alt-F9 and Alt-F10. These are the only two basic editing functions that use the function keys, and I found their positions ergonomically efficient.

The majority of the word processing functions are found on the remaining keys. The keys are divided into three levels:

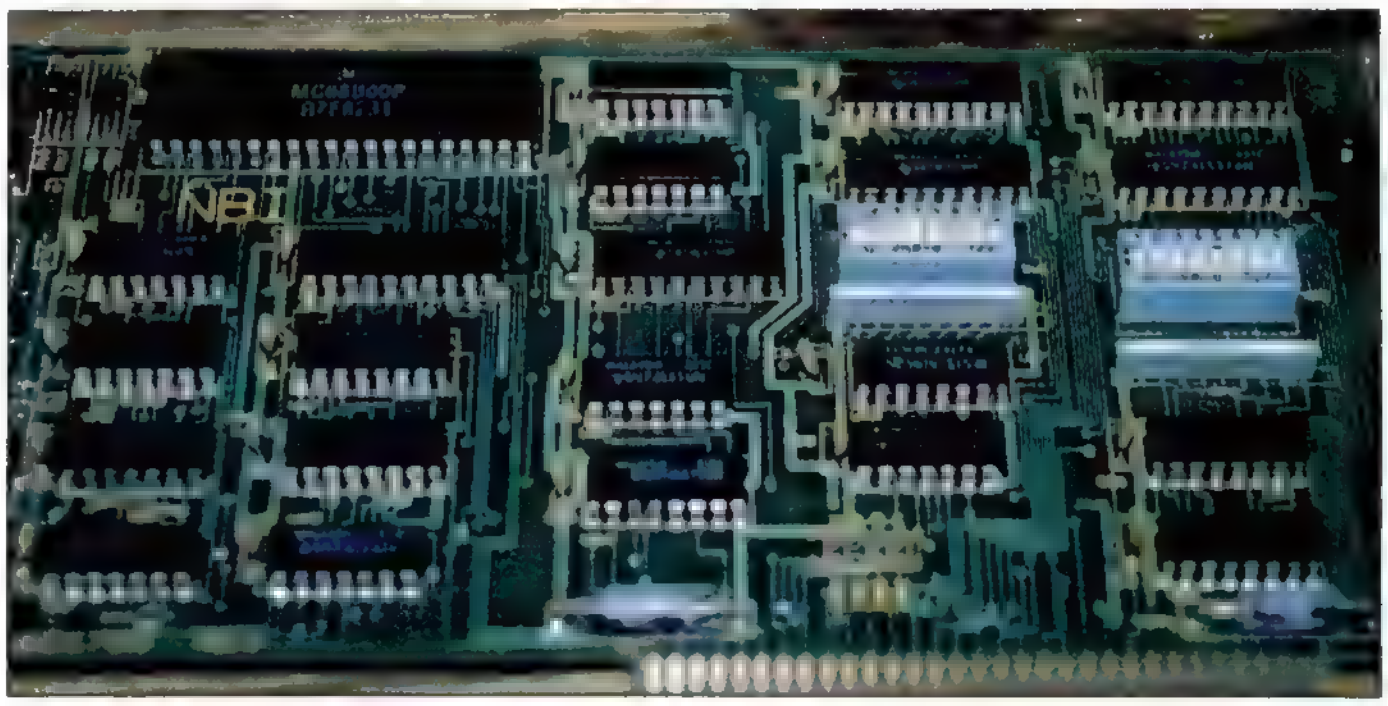

Figure 1: *Part of the NBI word processing board.*

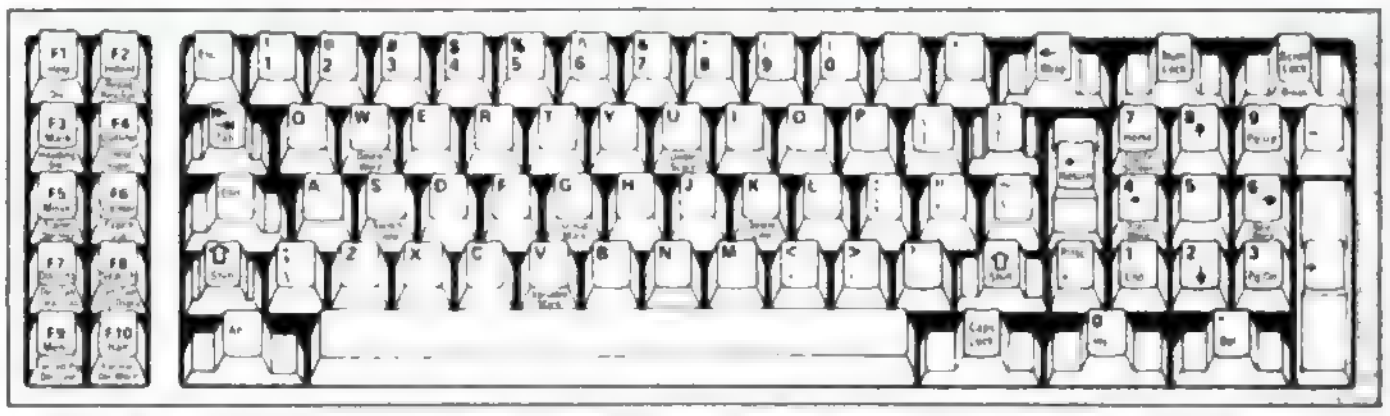

Figure 2: *The* NBI *keyboard guide. The labeled keys are truly representative of their functions.*

Figure 3: *The* NBI *Help Menu can be accessed anytime by pressing succesively.*

straight function keys, Alt plus function keys, and Ctrl plus function keys. A help menu that graphically illustrates the function and associated keystrokes can be called up whenever editing a document (see Figure 3). Three other levels of help are obtainable by successively pressing F1 (the help key).

After floating around the screen with the cursor, I decided to play with the insert function. I have never worked with a more intelligent inserter. Say, for example, you want to replace a seven-letter word with a nine-letter one. Many word processing programs necessitate overstriking the original seven letters, then engaging the insert function to avoid running into the next word. The *NBI* inserter, however, automatically engages when it encounters the first space after the word you are overstriking. This means you can madly replace words without worrying about destroying text. When the insert feature is explicitly engaged, moving the cursor with the arrow keys will disengage it—a feature that makes a lot of sense, considering my own editing habits.

Whenever a document is being recorded or edited, the screen keeps updating you with helpful information. On the bottom of the screen a status line, called the message line, displays the name of the document, the page number, and the line number. The cursor column position is tracked by a shadow cursor on a graduated dotted line marked numerically every ten characters. This character scale also indicates the current tab stops.

After moving the cursor around and deleting and inserting text, I noticed something very interesting about my blocks of copy. They were still aligned—there weren't any long lines extending beyond the margin or abbreviated three-word segments dangling at the end of paragraphs. Text is automatically reformatted on the screen whenever the cursor scrolls through a block. Technically, you can use several methods to reformat text on the *NBI*, but this one is the most demonstrative of the program's control over document formats.

This type of formatting power is possible because of the *NBI*'s method of creating and reading format commands. Format codes, which represent such parameters as page length and text length and width, are stored within the document. The codes also include functions for underscoring and using tabs, among oth-

ers. Stored format codes set up formats that apply only to the document you are presently working on—not the entire word processing session. For example, if you set up a 40-character text width in one document, and 78 in another, you can switch between the two without being concerned about resetting the respective widths every time you re-enter the document.

On the bottom of the screen a status line, called the message line, displays the name of the document, the page number, and the line number.

Formats are broken down into two categories: document formats and line formats. The process of setting up formats is straightforward and logical. The document formats include page length, text length, top margin, left margin, and character pitch (limited to 10 or 12). Line formats are line spacing, line length, and right justification. Line, text, page lengths, and margins may be entered either in inches or, more conventionally, by number of lines or characters. I found this option especially convenient when setting up pages with unusual formats. It allowed me to measure the margins with a ruler and enter the dimensions in inches without having to convert the measurement into lines or characters. Document formats may be set only once in the document, but line formats can be changed as often as necessary.

The line format changes are marked on the screen with squares called instruction squares. By placing the cursor under a format instruction square, the current line formats are displayed on the left side of the message line at the bottom of the screen. These squares not only represent format changes but also almost any stored command that is specified in the document. It is important to be able to see these squares when setting or editing commands, but they can clutter the screen when attempting to proofread the copy. To alleviate this problem, there is a screen mode that removes these squares and also the dots representing entered spaces from the screen, greatly increasing readability.

Headers, Trailers, Tabs

Headers and trailers are created as subdocuments. After you have selected the header function, the screen will clear and return to what looks like the beginning of a new document. There is no page number on the message line; it reads HEADER instead of the document name. Multiple lines of text may be put into the header along with a global page number command, if the pages are to be numbered automatically. A trailer works similarly.

The *NBI* provides two types of tabs: standard left and decimal. You can use the decimal tab to align columns of figures at the decimal point, or as a right tab.

These tabs are valuable word processing tools. Say, for example, you were setting up a table with five uneven columns using tab stops on what NBI calls its tab line. You set tabs based on the best estimate for the longest line necessary in each column. But when you get to the seventh row of items, you realize that column three is a few spaces short. Instead of manually moving the rows and adjusting adjacent columns by inserting and deleting spaces, you simply return to the tab line and move the tab to the desired position of the new column. Scroll back down through the text, and the columns reformat automatically.

Moving, deleting, and moving and saving blocks of text was effortless, for the most part. Text blocks (characters, words, lines, paragraphs, pages, and so forth) are marked at the beginning and end using the same mark function (F3). The text between the marks is highlighted to indicate the precise move. A block is highlighted by scrolling the cursor through the text. In this mark mode, however, only line-by-line cursor movements are allowed, so it takes a while to mark a large block. Also, I found that when I overshot my intended block, I couldn't scroll the cursor back. I had to cancel the mark function and begin again.

Document assembly is a standard feature on the NBI. Documents with variable text, such as form letters or contracts, are easy to construct and insert.

This is one place where the *NBI*'s frequent disk reading and writing comes in handy. If the block is marked to be moved, it appears on the directory as a file, named MOVE, but the file cannot be directly edited. This means that if you're in the middle of the move and remember you have a dinner engagement, you can shut down the system, and the block to be moved will be stored on the diskette. After dinner you can resume working where you left off.

Document insert allows you to recall a frequently used paragraph or block of text for insertion into another document. Position the cursor in the main document and select the document insert function. By typing the inserted document's name that document will be added to the main document beginning at the cursor position. Any document may be specified for insertion, and marked blocks of text may be set up as separate documents for insertion or standard editing.

Outlining

The outline feature makes keeping track of complex outlines a breeze. Tab stops are set at the beginning position of

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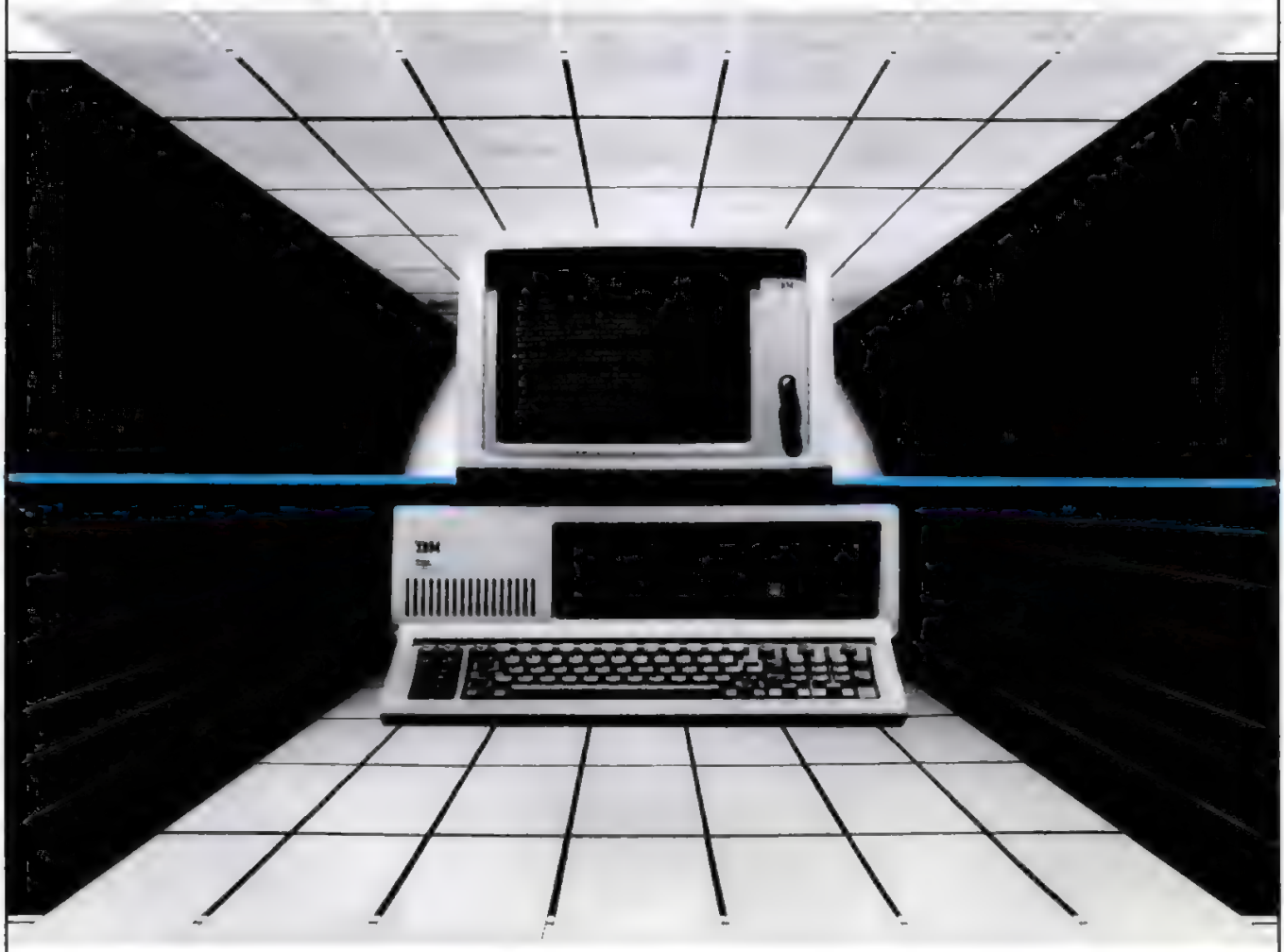

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text at each section in the outline. When you press F4 (for outline), the cursor moves to the tab stop and an outline character such as I., 1., or A. appears to the left of the tab. Outline levels automatically increase with each time you press F4. Multiple lines of text at any given level will also continue to indent from the beginning of the tab setting for that level automatically. You can set as many as six subsection tabs (that is, I.,A.,1.,a., and so forth), and the program will automatically keep track of the numbering for you. If outline items are added later, the numbering is updated automatically to maintain the accuracy of the outline labeling. Three types of outline settings may be chosen: Roman, Arabic, or multilevel, which is commonly used in procedural documents such as manuals or regulations (that is, 2.1, 2.1.1, 2.1.1.1, and so forth).

Document assembly is a standard feature on the *NBI*. Documents with variable text, such as form letters or contracts, are easy to construct and insert because the commands for document assembly are the only ones that are not accessed through the function keys (except for underscore, which is Ctrl-U). Since document assembly is not a frequently used feature, it's helpful to the user that the keystrokes for this function are coded differently than the rest of the word processing functions.

One of the best features of the *NBI* is the underscoring. Countless times, with other word processors, I have attempted to underscore a title, only to find that my whole page looked like something out of a Big Chief notebook because I had forgotten to turn off the underscoring. The *NBI* solved this problem by providing on-screen underscoring (see Figure 4). That's right, you can actually see what you are putting a line under. No more surprises.

Some of the program's refinement features are handled in what NBI calls passes. One of these is the hyphenation pass. The document is scanned for "hot zone" violations—blanks at the end of a line exceeding a specified number (default-five characters). When such a situation is encountered, the pass stops and the prompt asks whether the word is to be hyphenated. To do so, position the cursor under the breaking point in the word and press the "H" key. To ignore the hyphen request, press return and the pass continues. Three hyphens are available on this program: regular, blocked, and discretionary. The blocked hyphen is used to keep a hyphenated group on the same line, such as "CL-12-a." A discretionary hyphen is represented with a caret (^). If a discretionary hyphen is encountered during repagination and the word no longer falls at the end of the line because of subsequent editing, the word is printed without a hyphen.

Another pass is called the widow/orphan, and is a real bonus. Just before I printed text, I ran this pass, which checks to see that the last short line of a paragraph doesn't sit on the top of a page (an orphan) and that the first line of a new paragraph doesn't begin on the bottom of the page (a widow). These problems are resolved by deleting or adding words to change the text length. Widow/orphan and hyphenation passes will also reformat text.

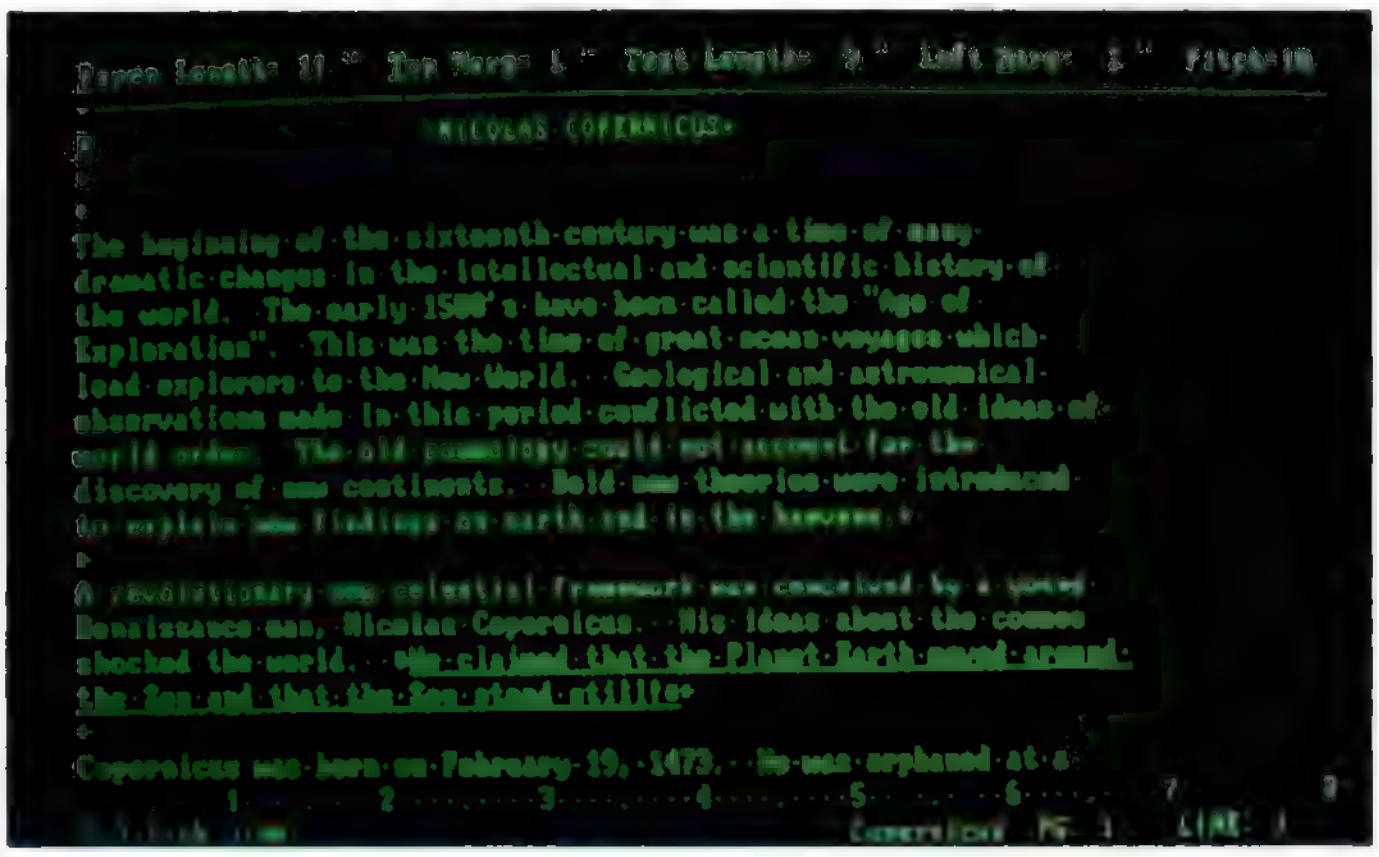

Figure 4: NBI *provides on-screen underlining.*

Figure 5: NBI *operation menu with the print option selected.*

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Printing documents is a controlled process. You select the print operation from the Operations Menu (see Figure 5). A short list of print options appear, such as single sheet or continuous feed and selected page print. Once you select your options, you are prompted to insert the paper and press return. This is the one function in the program that does not allow you to get ahead of the prompt, which is a good safeguard against starting the run without inserting paper in the printer. I noticed that my 3500Q printer and the *NBI* actually communicated a little with a printer error checker to see if the printer was on or off.

There are options for document assembly, print assembly, and print style, too. Documents previously prepared for document assembly are brought together during the printing process. When the document assembly option is selected, you are asked to enter the name of the main document. Then the program prompts you for the variable document (a list of names and addresses, for example). If you want to use only certain names from your list, you specify which ones by entering individual index numbers. That's all there is to it.

The print assembly option lets you merge documents during the print operation, while keeping the individual document files intact. This is a handy method of breaking down large jobs into documents of a more manageable size.

NBI allows you to insert instructions within documents to specify two different type styles for letter-quality printers. The main body of the text is specified as print style #1. Then, for example, if you want to print a word or group of words in italics, that text would be specified as style #2.

Documents with two print styles are printed in two passes. When you select print style #1 the document prints leaving space at points where print style #2 was indicated. Then you realign the sheet, place the second print wheel in the printer and select the print option for style #2, and the printer fills in the blanks. This method saves you from having to change the print wheel numerous times, but realigning the paper can be a bit tricky especially since any underscoring, whether specified in print pass style #1 or #2, is printed in the #1 pass.

> It is comforting to know a password can be broken as well as removed.

Print operations are handled as background routines, which allows you to edit one document while you print another.

External Routines

NBI has packed many excellent features into its word processing program. However, like many complex programs it requires a few external routines for certain features.

In the "Getting Started" section of the *Training Guide* you are instructed to back up the *NBI* Utility I and II diskettes with the install routine (the only routine directly accessible from DOS).

There are two different types of diskette formats used by the *NBI* system: utility and word processing. To avoid trouble, each must be prepared and initialized with its use in mind, and neither of the *NBI*'s diskette formats are directly compatible with DOS.

While word processing, the diskette containing word processing software must be in drive A at all times. The remaining drives will accept either storage diskettes or word processing initialized diskettes. Storage diskettes have the same format as word processing diskettes, except that they do not contain software. Storage diskettes can become word processing diskettes by updating—that is, transferring the program over to the storage diskette.

Word processing software diskettes are also tailored from the programs on the utility II diskette. The first and most important one is the printer tailoring. The man-

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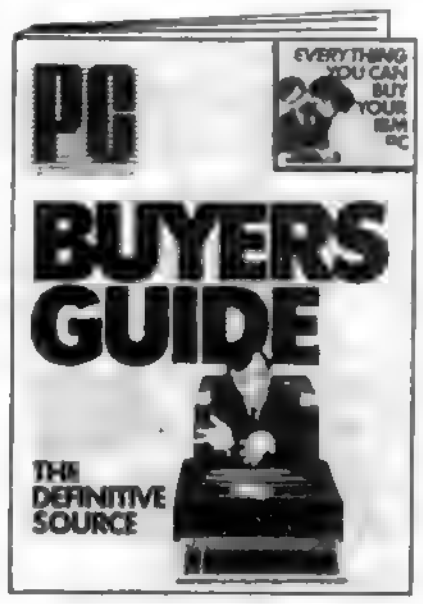

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NL2C

ufacturer selected Qume Sprint 9/11, Diablo 630, and NEC Spinwriter 3500Q as selectable letter-quality printer protocols and Epson MX 80 and 100, Okidata 84 Microline, and NEC 8023 dot-matrix protocols. There are three additional user/definable printer selections, which are indicated as A, B, and C.

Other tailors included setting a hot zone for hyphenation, which unfortunately fixes all hyphenation passes when using that tailored word processing diskette. To make a pass using a different "hot zone" setting requires retailoring a word processing diskette. Conceivably, you could start a collection of diskettes with a variety of tailors for different printers and different hot zone specifications. This way setting the hot zone for each pass would not be such a problem and hyphenating would become a bit more flexible.

A utility routine also allows you to use passwords with diskettes. For those with short memories, like me, it is comforting to know a password can be broken as well as removed.

All of these external procedures reflect *NBI*'s structured approach, which provides a word processing program that is both powerful and relatively friendly.

An Unfriendly Exit

This friendly operation is true for all but one of the *NBI*'s operations. The program has a mandatory procedure for opening and closing entire diskettes while word processing. If you skip this procedure, you will be severely reprimanded and forced to run a program found on Utility II called Recovery. Like most users, I am used to saving text files and shutting down, but this is not possible on the *NBI*. You have to tell the program that you are finished and ask it to close the diskette in preparation for powering down. It is a simple matter of pressing the "O" key for "remove diskette." As trivial as this procedure is, it just isn't something that you'll remember to do. If you forget (which of course I did) you'll have to run the infamous Recovery routine.

Recovering a diskette means rectifying the problem of not "removing" the diskette properly. The routine takes between 5 and 10 minutes depending on the amount of text on the diskette. It also checks for bad diskette tracks.

I am used to saving text files and shutting down, but this is not possible on NBI.

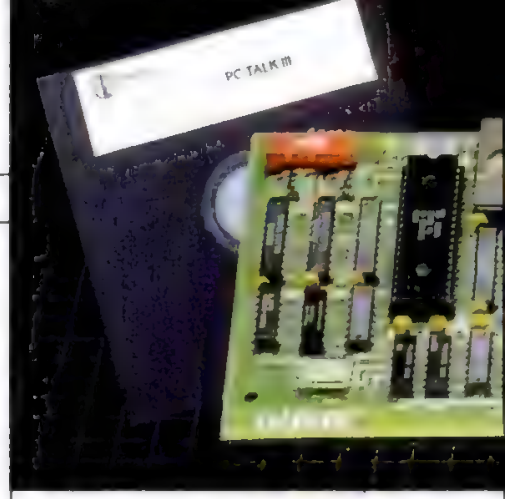
The recovery procedure is also necessary after an OOPS or OOPSD error. These mainly occurred while I was scrolling back and forth through the text fairly rapidly. The *Reference Guide* is a bit vague as to exactly what types of errors these are, but, according to Char Bain of NBI's Technical Support Group, they are software errors, possibly caused by an unusual encoding of format or other instructions. Determining the exact cause would require thorough analysis of the keystrokes leading up to the error.

Using the recovery routine after an OOPS error or improper exit will sometimes cause a loss of text. If the OOPS occurs while simply entering text and the buffer had not yet been written to disk, approximately a page could be lost. However, text can be lost at the point the error occurred in pre-entered text. In this case, you can recover the material by searching through a file named "salvage"—a home for lost text. If you do not recover the diskette, the program won't allow you to use it for future word processing operations.

In any case, I found this section of the operation of the *NBI* word processor troublesome and time consuming. I would like to see the diskette initialization and "Remove" completely eliminated from future versions.

File Transfer

For PC users who also operate NBI's dedicated word processors, the 3000 or



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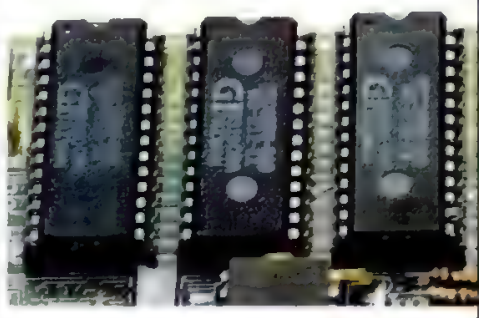
Digital Signal processing



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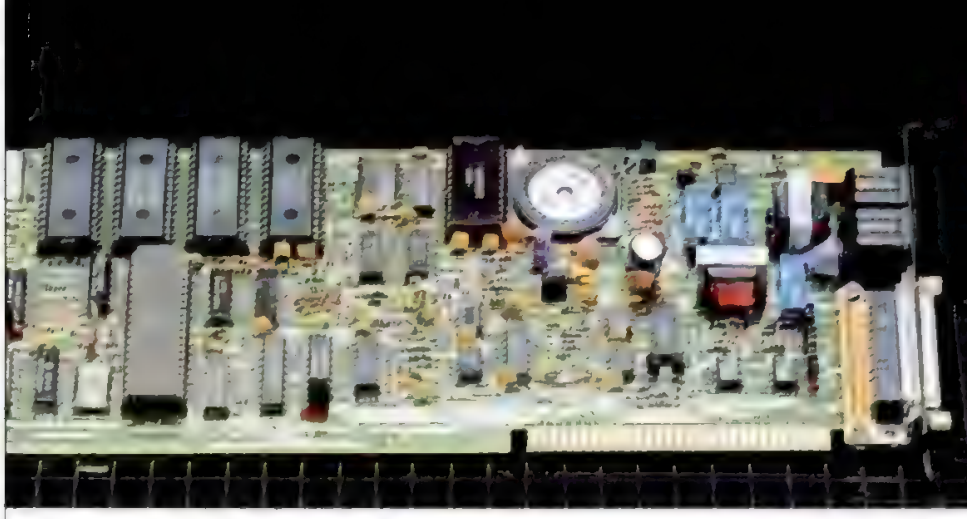

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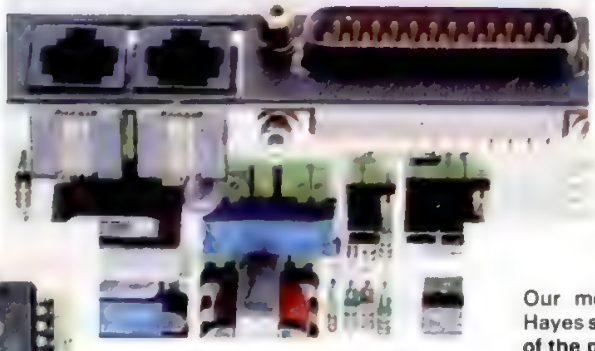
ADVANTAGE #2

Optional external serial port connector



AN ASYCHRONOUS ADVANTAGE

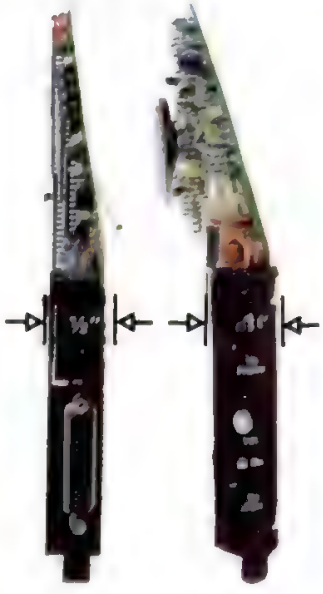
The modem board is addressed in the software as COM1 or COM2 and we have a handy little option you ought to consider. If you would like to use the asynchronous communications port when your modem is not in use, we will add a connector and the necessary circuitry for just $20. This saves you the hundred bucks or so you would spend for another async card and saves a valuable slot. It can be configured as COM1 or COM2 and works just like IBM's does.

THIN IS IN

It plugs into your IBM PC or XT and occupies any one slot since it is just 1/2 of an inch thick. This is made possible by using a special speaker which is just 1/8" tall. Competing brands either use a convential cone type speaker, or they just skip the speaker altogether. Some modems also have large transformers which allow rob valuable space.

ADVANTAGE #3

Just one slot in PC or XT



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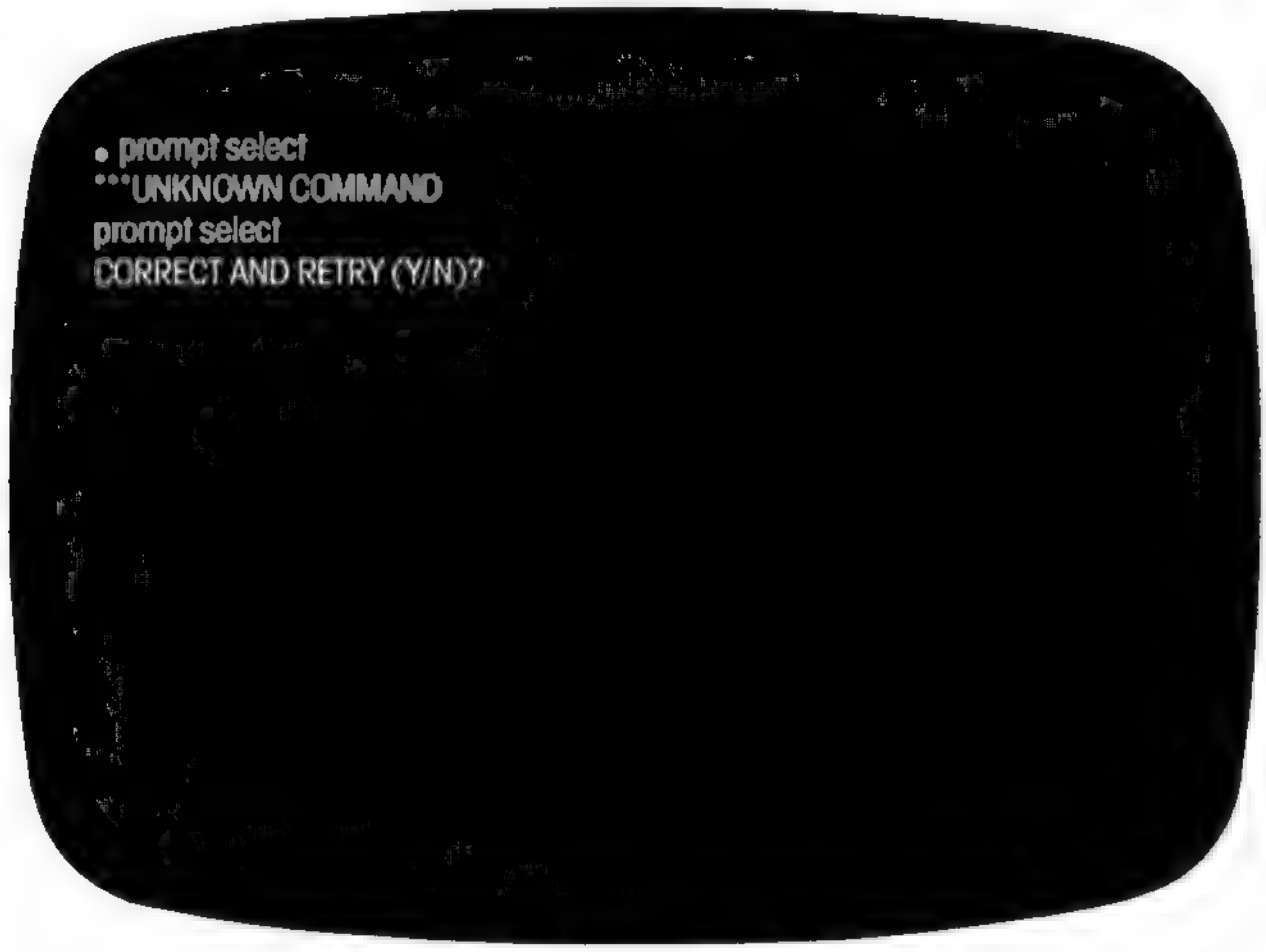
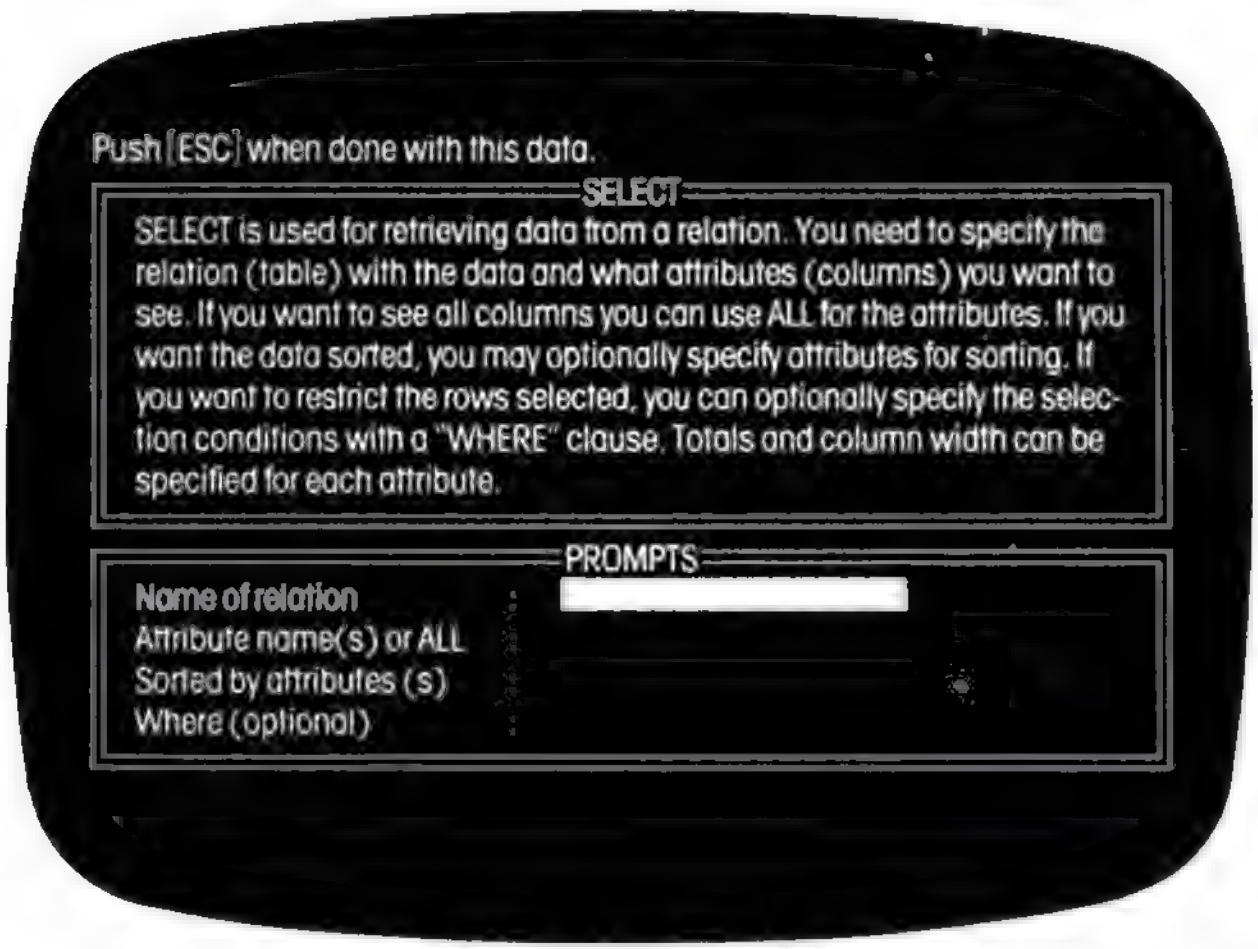
d hard way.


• prompt select
***UNKNOWN COMMAND
prompt select
CORRECT AND RETRY (Y/N)?

R way.



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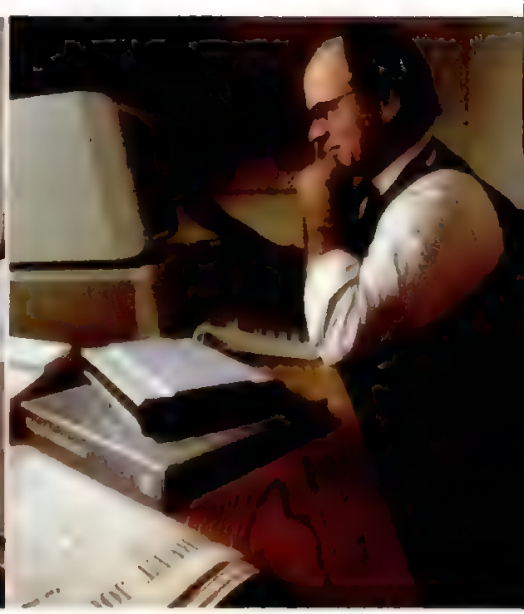

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Smartcom II communications software.

NOTE: Smartmodem 1200B may also be installed in the IBM Personal Computer XT or the Expansion Unit. In those units, another board installed in the slot to the immediate right of the Smartmodem 1200B may not clear the modem; also, the brackets may not fit properly. If this occurs, the slot to the right of the modem should be left empty.

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NBI WORD PROCESSOR

3000/s, the package provides a communications program that allows *NBI* file transfers between a PC and the 3000. You can select a transfer rate between 150 and 9600 baud; the program requires asynchronous communication using a standard serial port connected to a modem or a port to port connection with a modified RS232 pin configuration.

The technical support group at NBI demonstrated the transfer for me. The communications program is menu driven and easy-to-follow. However, at the time of this writing, the program only allowed for file dumps from the PC to the 3000, not vice versa. The 2.0 release promises two-way communications transfers, which will certainly be a nice plus for those who have access to both home and office systems.

The 2.0 version includes hard disk and MS-DOS 2.0 compatibility and some enhanced features. The hard disk should speed up the overall access time considerably, which will make the program flow at a more productive pace.

Documentation

The documentation includes two manuals, both of which are compact and precise. The bulk of the *Training Guide* is a 17-lesson tutorial. In combination with the training sample documents on the word processing diskette, the document lessons provide a logical and thorough course in the operation of the *NBI* system. Each lesson begins with a summary of the commands and features to be covered and follows through with step-by-step instructions. I found it especially useful to have the text pre-entered on the diskette, enabling me to go from one point to the next without the tedium of typing another *War and Peace* in the process.

The *Reference Guide* lists the commands and features in alphabetical order and therefore gets caught up in a Catch-22 situation. To look up a certain feature, you must know the name of that feature. The manual is cross-referenced, though, and the "Features" section works well enough. In the back of the *Reference Manual* is the Message section that explains the meaning of certain error-prompted messages.

And if the manuals don't cover the problem, NBI will. Get this—the company has a direct, toll-free number (1-800-223-3626) to NBI Technical Support Personnel from 8 to 5 (MST) if we run into any problems or if we are just curious about its capabilities.

> When I overshot my intended block, I couldn't scroll the cursor back.

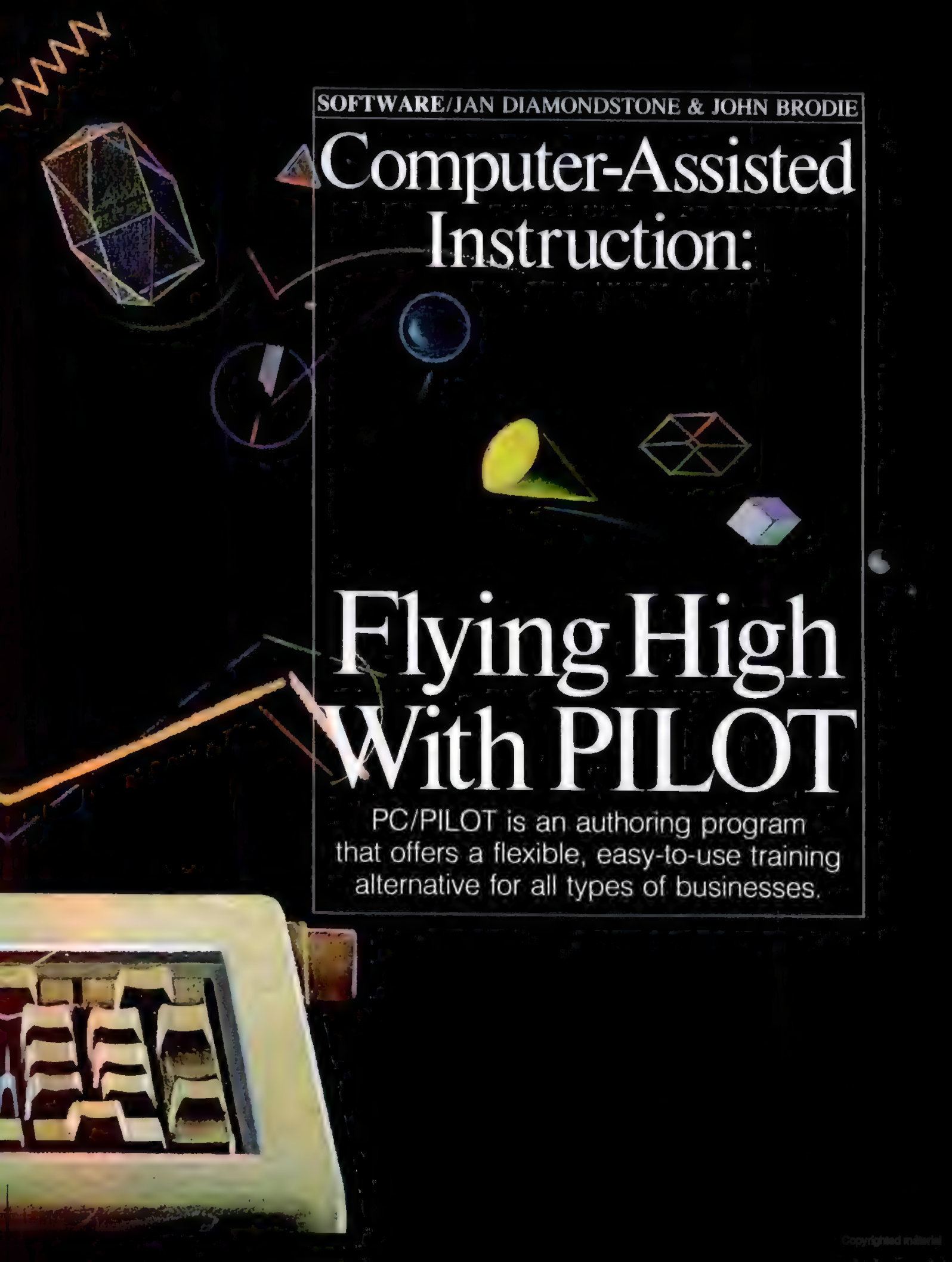
The Bottom Line

So it comes down to the bottom line. As far as document-oriented word processing software goes, NBI has some of the best dedicated systems around, but how is its PC software package? The *NBI* is a sweet collection of features that fits the needs of many word processor users. The program is easy to learn and the variety of functions makes it a versatile home or office editing tool.

The code transfer to the IBM has been successful, with the exception of those obstinate OOPS errors.

This was NBI's first attempt to work with the micro market; the product reflects the manufacturer's effort. I look forward to future word processing programs from this company. Version 2.0 promises feature enhancements that should increase the program's flexibility. I don't, however, expect to see a program producing open code text documents soon. Besides offering structure to the program, locked code also affords NBI with a degree of marketing control that it is unlikely to give up for quite some time. ■

Anthony Pompili is a free-lance writer and computer hobbyist who lives in Boulder, Colorado.



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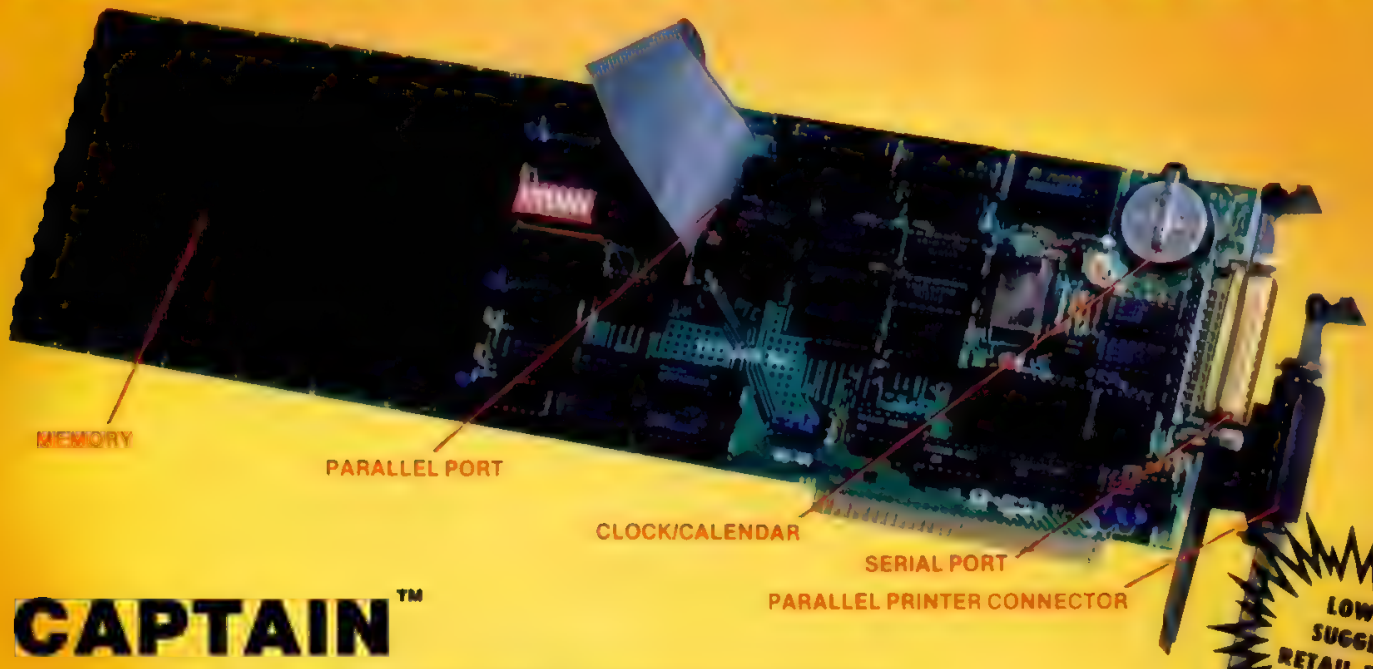

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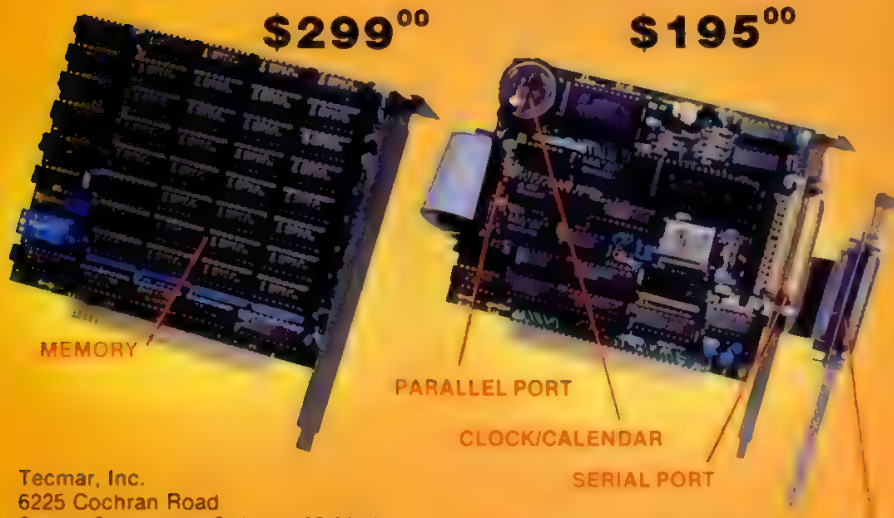

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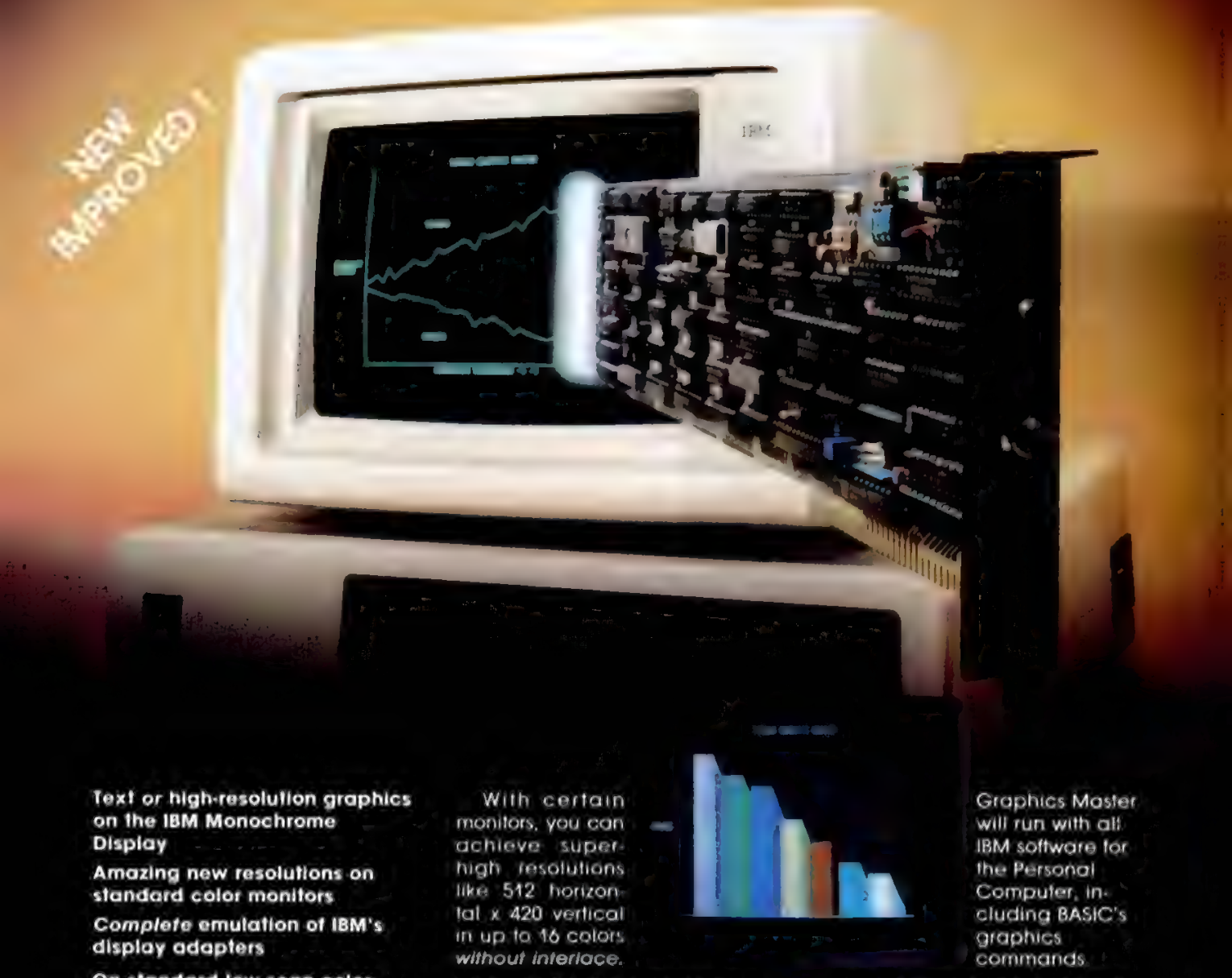

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There isn't much unskilled work left in the modern business world: More and more tasks require formal training. The rising need for quality training has led to a resurgence of Computer-Assisted Instruction (or CAI).

Early efforts to use computers for training in business were not always successful. The programs generally followed the formats of high-school textbooks: Read this chapter; then answer some questions. These programs suffered for other reasons, too. Designing them entailed a lot of work, and the final result was often bogged down by programming details and didn't cater to the people who would be actually using them.

Fortunately, most of these problems are now behind us. Software that allows development of effective, creative, flexible, and responsive CAI is abundant. The declining cost of technology has put systems in offices that never before had computers. Access to computers is so widespread that most workers can take advantage of CAI without a lengthy absence from their regular jobs.

Perhaps, most importantly, today special "authoring" sotware allows excellent CAI to be developed without becoming bogged down in the programming. This authoring software permits a complex evaluation of user input, including correction of misspellings, search operations, and sequence checking for responses with several elements. CAI is no longer limited to the boring—and instructionally superficial—multiple-choice question or one-word answer.

CAI today can use graphics, animation, and sound effects to create striking visual designs. It can also use touch screens, voice synthesizers, videotapes, and videodisks. One of the most sophisticated of these programs is the United States Army's Space Time Army Reconnaisance System (or *STARS*). This program combines high-resolution touch monitors and videodisks for specialized training. The army has pioneered the use of CAI techniques to help handle its enormous training requirements.

An example of a CAI authoring program is Programmed Instruction Learning Or Teaching (*PILOT*), which is now available for the IBM PC as *PC/PILOT*. It has been around since the early seventies and the standard version is called *COMMON PILOT*. Originally it was designed to be used by school teachers who needed to devise lessons but didn't have the time to learn complex programming languages.

This program is easy to use. Here's an example developed using *PC/PILOT*. A shop called Square Wheel Bicycles uses a PC for accounting, planning, and inventory management, but the store's most creative application is a *PILOT* program, which is used to train the college students who come to work in the shop to handle the overflow repair business every spring. Figure 1 shows part of the store's CAI program.

In Figure 1, R: is the *PILOT* instruction for Remark. Its format, a one- or two-character mnemonic followed by a colon, is common to all *PILOT* instructions. Following the colon, you type in the text of the remark. If it is more than one line, put a colon at the front of the line to indicate a continuation and keep going. Remarks appear throughout the program.

The instructions in the first part affect the way the computer and the CAI user interact during the session. The D: instruction allows you to set the dimension instruction for a variable, which will hold the user's name. The PR:, or Problem,

A Glossary of CAI Terms

Here's a list of definitions of some of the terms used in the article.

Authoring: The task of preparing instructional material that will be presented by a computer.

Authoring language: A high-level programming language with features and instructions designed to aid the authoring process.

Authoring system: A program that provides preformatted presentation and testing layouts, so that the author need enter only the material to be presented and the test questions. Advanced authoring systems provide support for graphics, sound effects, and other training aids.

CAL: Computer Aided Learning. An inclusive term embracing Computer Based Training and CAI.

CBT: Computer Based Training. Another term for CAI, it is often encountered in business or military settings.

CMI: Computer Managed Instruction. Use of the computer to organize a learning process that uses text, lectures, audio-visual materials, and occasionally, CAI. CMI keeps track of test scores, units covered, and similar information about the training process. In CMI, the computer is not used as a direct training tool.

Delivery system: The way in which information is presented. A lecture is one kind of delivery system; CAI is another.

PILOT: Programmed Instruction Learning Or Teaching. An authoring language originally developed in the early seventies. PILOT is available on several microcomputers, including the IBM PC.

PLATO: An extensive CAI system developed on mainframe computers by Control Data Corporation. Several PLATO materials are now available for microcomputers.

instruction follows. This sets up some conditions that will be used in handling responses to questions that follow. The problem instruction is used to change all characters in user responses to uppercase. Other modifiers to PR: can allow the user to exit the session or skip to another part of the material when certain responses are entered.

The TS:, or Type Specify, command is used to control screen modes and colors. The two operands of the TS: instruction set up the graphics mode and the background color for the display. The screen modes in *PC/PILOT* correspond to the ones you use in BASIC.

A few added instructions (see Figure 2) give the session shown in Figure 1 a friendly, personal touch.

The statement called *Hello is a program label that can be addressed by other instructions. It can appear alone on a line or it can precede a command. The current version of *PC/PILOT* allows for labels of up to six characters to be created.

The statement called *Hello is a program label that can be addressed by other instructions.

The T: instruction, which stands for Type, puts text on the screen. Think of it as a print or display command. The A:, or Accept, command receives the response you type in and will enter information in a specific variable if you tell it to do so. All it needs is the variable name preceded with a number sign (#) for numerics or a dollar sign ($) for strings. If no variable is indicated, the A: command will put the response in *PILOT*'s system answer buffer, which has the name, "%B." The PR: instruction we used in the set-up part of the session affects the way the Accept instruction works. Anything the user keys in as a response to a question will be changed to uppercase because that's what was specified in the PR: instruction. For instance, if the user responded by entering "Bob," the A: command will store the response as "BOB."

The next Type instruction gets the user's response and prints it out in the middle of the next string. If the user entered his name as, say, BOZO, the T: instruction would display "Hi, BOZO. I hope you're into bicycles." The expression N in the string tells the Type instruction where to find the response. It could also be found in the *PILOT* answer buffer.

The program then asks another question to see if basic material needs to be covered (see Figure 3). This time the answer is put into *PILOT*'s answer buffer and isn't kept as a variable.

The Match instruction, M:, is one of the major sources of *PILOT*'s power. It combines tremendous versatility with ease of use. The instruction (as shown in Figure 3), will accept three alternative answers, each of which can be part of a longer answer. It will accept replies such as, "Yeah," "I sure have," "LAST YEAR," "that's right," and hundreds of variations. Since the A: instruction put all the answers in uppercase, you don't need to check for variations in keying style.

The exclamation point (!) in the Match instruction stands for the word "or." The word "and" can also be included, which checks to see that all the parts of the response have been entered and that they're in the right order. The Match com-

```
 R: Square Wheel Bicycle Training-Wheel Hubs
  : Revised by Don C. 10/05/82
 R: Set up a variable to hold the user's name
 D: N$(10)
 R: Convert all responses to uppercase
PR:u
 R: Set the PC for medium-res graphics
  : The screen will be cleared
  : Make the background color blue
TS: M4,B1
```

Figure 1: *Part of a CAI program developed by Square Wheel Bicycle for training its employees.*

```
*Hello
R: Be polite, but get the name
T: Hello, what's your name?
A: $N$
T: Hi, $N$. I hope you're into bicycles.
```

Figure 2: *This* PC/PILOT *training program is polite to its users.*

```
 T: Have you worked at Square Wheels before?
 A:
 M: YES! SURE! RIGHT
TY: Good. We'll skip the rules of the road.
JN: Rules
 W: 40
```

Figure 3: *The* M: *instruction is a major source of* PILOT*'s power.*

mand can also be set up with modifiers that allow it to handle misspellings. It can use wildcard characters to test for matches, in the same way that DOS uses the asterisk (*) in filename operations.

When the Match instruction completes its work, it sets the *PILOT* "true-false" flag, which isn't reset until another "M:" instruction is found. The TY: instruction stands for Type if YES, meaning "Display this string if the true-false flag is 'true'." The JN: instruction means Jump if NO, and if the true-false flag was set to false, it will lead the user to the part of the session that begins at the label, *Rules.

The W:, or Wait, command lets the session pause for 4 seconds (expressed in Figure 3 as 40, for tenths-of-a-second). Wait commands give the user time to read the material presented on the screen and are found throughout *PILOT* programs. This command will end when the allotted time runs out or when the user presses any key.

Information On Review

The next part of the session presents material for the bicycle store employee to review (see Figure 4).

The GX:, or Graphics Execute, instruction takes a file called "Hparts," which is a diagram of a hub, and displays it on the screen. This diagram was created with *PC/PILOT*'s graphics editor, but users could also use *PC/PILOT*'s GX: command to display graphics developed with other packages. *PC/PILOT* can display any binary bit-mapped graphic diagram that has been saved as a file on disk. The Hparts display is easy to set up and also includes text to label the parts.

The Type Specify command is a handy feature that allows you to define viewports on the screen. A viewport is a section that this instruction will use when it puts text on the screen. This feature allows the designer to keep graphic images on one part of the screen while scrolling text on another part—imagine how much work it would take to set up this situation in BASIC or Pascal.

```
*Hubs
R: Load the graphics file which has the diagram
 : of the hub. The diagram includes text as
 : follows-
 :  The hub has five main parts
 :       The Hub Shell
 :       The Axle
 :       The Bearings
 :       The Cones
 :       The Seals
GX: Hparts
 W: 100
TS: V0, 20, 0, 23
 T: In addition, there are nuts
  : to fix the position of the
  : cones and quick-release
  : "skewers" to hold the wheel
  : on the bike frame.
 T:
 T: Press the spacebar for more
 W: 300
```

Figure 4: *This part of the session presents material for the user to review.*

If the 30-second wait at the end of the segment seems a little long, remember that the time can be cut down by hitting any key. The text suggests hitting the spacebar.

> PC/PILOT can redefine the font used for displayed characters, but this feature isn't convenient.

The TX: command clears the viewport, but it will leave the diagram in place. It sends the cursor home to the top left corner of the screen. In Figure 5 we could have emphasized the sentence, "Never put the axle in a vise," by displaying it in a different color. *PC/PILOT* has the ability to redefine the font used for displayed characters, but this feature isn't convenient to use. This is an area where *PC/PILOT* is weaker than other versions, which save alternate character fonts as loadable files.

Figure 6 demonstrates the use of the G:E command (the graphics instruction with the Erase option). This command clears the screen, including the diagram. The program then asks a question about the material previously presented, and the user types in the answer. If the true-false flag was set to True, the user will move ahead to instruction JY:.

The next group of instructions demonstrates *PILOT*'s power in handling wrong answers. The two instructions, T2: and J2:, use *PILOT*'s built-in answer counter feature. Each time a specific A: instruction is executed, *PILOT* adds the number 1 to its answer counter. The counter is reset when a different A: instruction is executed. J2: and T2: instructions are executed if the counter registers 2, which indicates two incorrect answers. If the answer counter was 1, neither of these instructions would be executed.

```
*Tools
TX: To work on hubs, first make sure
  : you set up your workspace with a
  : place to put loose nuts and
  : bearings.
  : We use egg cartons and Big Mac
  : cartons (after they're cleaned).
  : Never put the axle in a vise.
  : You can ruin the threads and the
  : cone nuts that way.
 T:
 T: Press the spacebar for more
 W: 300
```

Figure 5: *In* PC/PILOT *the* TX: *command clears the viewport.*

```
 R: Now let's see if they were paying attention.
    *HTest
 G:E
 T: How many parts are there in a hub, not
  : counting the nuts, washer or skewers?
 A:
 M: 5!FIVE
JY: Hubok
 R: If they can't get it right in two tries,
  : repeat the show and tell.
T2: Looks like you need some review, $N$.
J2: Hubs
 R: He missed it, give him another try
 U: Wrong
 T: Think about the MAJOR parts of the hub, $N$,
  : tell me how many there are.
 J: @A
```

Figure 6: *The* G:E *command executes a Graphics instruction with an Erase option.*

If the user's first answer was wrong, the program goes to the U: (or Use) instruction, which is a subroutine call that is similar to GOSUB in BASIC. The sequence of instructions beginning at the word "Wrong" would be executed and the program would return to the statement following the U: instruction. The instructions in response to "Wrong" are given here. The program simply tells the user that he botched his answer.

The Jump instruction at the end of Figure 6 demonstrates an interesting feature of *PILOT*. It uses the "at" sign @A instruction to indicate that the jump sends the program back to the last A: instruction, without having to supply a label or line number. *PILOT* has a number of similar features that allow the program to jump between Accept and Match instructions without setting labels all over the place.

The final part of the session begins at "*Hubok" (see Figure 7). *Hubok shows how a label can share a line along with an instruction.

The L:, or Link, instruction allows the user to link with another *PILOT* program, which will teach a session on spokes. Using the L: instruction allows *PILOT* sessions to be developed as small, maintainable pieces that can be put together like a child's building blocks. The user responses in one segment can be carried over to the next segment by executing the Link statement.

The final command shown in Figure 7 is the E:, or End, instruction. The E: instruction appears at the end of each session; it also appears at the end of each group of instructions that has been called with a Use instruction.

The user responses in one segment can be carried over to the next segment by executing the Link statement.

More About PILOT

There's plenty in *PILOT* that wasn't explained in this example. *PILOT* has a full set of computation instructions and can handle multidimensioned arrays. It also has explicit string-processing functions for editing responses under program control and supports a set of useful arithmetic and trigonometric functions. The language supports interfaces to video recorders and other audiovisual devices and has facilities for keeping records of a session user's performance, which can be used to check the effectiveness of the presentation. *PILOT* can provide limited animation of text and graphics. The range of tools provided by *PILOT* can help produce a truly spectacular CAI program.

Working with traditional training programs is frequently a passive experience. Participants sit, take notes, try to listen

Product Information

Here's a list of CAI authoring systems and languages available for the PC.

AUTHORING LANGUAGES

PC/PILOT
Washington Computer Services
3028 Silvern La.
Bellingham, WA 98226
(206) 734-8248
List Price: Single-use license, $100; multi-use license, $550; manual only, $25; version updates, $50.
Requires: 64K RAM, two disk drives.

PILOT Plus
On-Line Computer Systems
20251 Century Blvd.
Germantown, MD 20874
(301) 428-3700
List Price: Single-use system, $500 (includes all support systems), runtime systems, $50.
Requires: 128K RAM, two disk drives.
Description: Extended version of *PILOT* that offers greater control to sophisticated CAI developers.

EnCORE (forthcoming)
Courseware Applications, Inc.
206 Burwash Ave.
Savoy, IL 61874
(217) 359-1878
List Price: $2,000 (estimated).
Requires: 128K RAM, two disk drives or hard disk, color monitor.
Description: Offers 100 commands, extensive graphics support, animation, and subscript/superscript characters.

AUTHORING SYSTEMS

Insight
Whitney Educational Services
1777 Borel Pl., # 416
San Mateo, CA 94402
(415) 341-5818
List Price: Interface package, $990; authoring package, $990.
Requires: 128K RAM, two disk drives, color monitor.
Description: Allows nonprogrammers to develop integrated programs, combining text, graphics, and videotape or videodisk events. Supports multilevel branching, stores student responses, compatible with graphics and word processing programs.

ADROIT (forthcoming)
Applied Date Research
Rt. 206 & Orchard Rd., CN8
Princeton, NJ 08540
(201) 874-9000
List Price: Authoring system (estimated), $3,000; first ten student disks, $200 each (volume discounts).
Requires: 128K RAM, two disk drives.
Description: Menu- and prompt-driven. Flexible color video support, light pen support. Will provide link to mainframe.

MH/IAS
McGraw-Hill Book Co.
1221 Avenue of the Americas
New York, NY 10020
(212) 512-2000
List Price: License for in-company use, $1,500.
Requires: 128K RAM, two disk drives, color card, RS-232 card.
Description: A highly prompted, menu-driven program.

The Author
Phoenix Performance Systems, Inc.
324 South Main St., #1
Stillwater, MN 55082
(612) 430-2980
List Price: One-time licensing fee for basic version without graphics, $295.
Requires: 64K RAM, one disk drive.
Description: Menu-driven program with highly prestructured frames and prompts, text-oriented, can be used on small system.

Trainer 3000
Computer Systems Research, Inc.
40 Darling Dr.
Avon, CT 06001
(203) 678-1212
List Price: Authoring program, $525; presentation disk, $85.
Requires: 128K RAM, two disk drives.

Eazylearn
Miracle Computing
313 Clayton Ct.
Lawrence, KS 66044
(913) 843-5863
List Price: $170.
Requires: 128K RAM, two disk drives.
Description: Offers preprogrammed side effects and produces up to 32,000 screens.

Torricelli School, Editor and Scribe
Answers in Computers
6035 University Ave, #7
San Diego, CA 92115
List Price: School program, $150; editor, $295; scribe utility, $150.
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Description: Three-program authoring set. Scribe utility includes spelling checker and line graphics.

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```
*Hubok T: OK, $N$, you get an "A" in hubs
      L: Spokes
      R: End of hubs section
      E:
```

Figure 7: *The* L: *command allows the user to link to another* PC/PILOT *program; in this case, "Hubs" is linked to "Spokes."*

without dozing off. In addition, these programs usually don't test to check what was learned.

CAI, on the other hand, requires active participation. Users are constantly checked to see if they understand what was taught. Furthermore, this information is taught in problem situations, so the knowledge is actually applied. This proverb sums up the benefit of CAI: "Active learning saves learning in long-term memory. Passive learning gets cleared in RAM as soon as a new program is loaded."

One important factor is the way CAI takes maximum advantage of the user's time. Experts can zip through, average learners can concentrate on new material, and novices can take their time, not the time of others. And with CAI, users can schedule their own training program to fit their particular job schedule.

Does this mean that businesses should put in PCs and put an end to traditional training classes? No, not necessarily. There are many situations where group interaction is critical to the learning process. What CAI can do is make your instructors more effective. Instead of standing up and going through repetitive routines, their time can be freed up to work one-on-one with the people in the group. CAI can take over the presentation of the basic material and the instructor can concentrate on the parts of the learning process that require human interaction.

With the availability of tools such as *PC/PILOT*, the potential improvements in training methods can be realized at reasonable cost. The CAI developer is no longer limited by the complexities of programming—only by his imagination. ■

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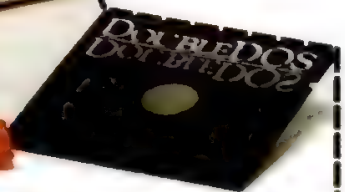

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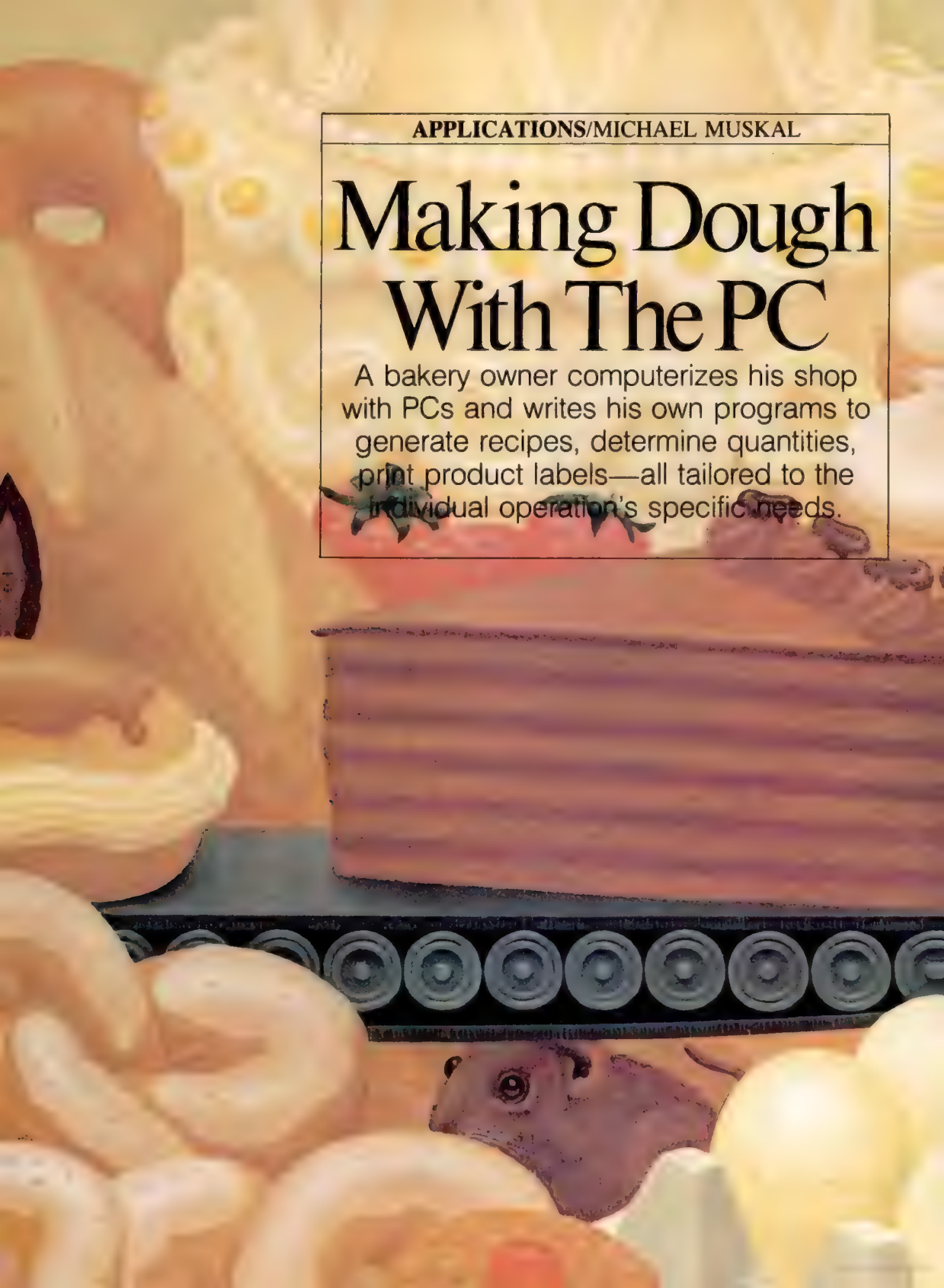

APPLICATIONS/MICHAEL MUSKAL

Making Dough With The PC

A bakery owner computerizes his shop with PCs and writes his own programs to generate recipes, determine quantities, print product labels—all tailored to the individual operation's specific needs.

MAKING DOUGH

The air is filled with the smell of freshly baked bread. Donuts, danishes, and confections are lined up with military precision on trays in glass cases. You're inside the Deerfield Bakery, located 30 miles outside of Chicago in a suburb of the same name. This bakery may look and smell like many others, but its recipes call for an unusual ingredient: IBM PCs.

The Deerfield Bakery is managed by Karl Schmitt, whose family has been in the baking business since his great-grandfather began the tradition in Germany. From there the family came to Chicago where it operated the bakery until moving to the present location 11 years ago.

Schmitt became part owner of the store in 1979 when he gave up his career as an actuary and brought with him the programming skills he gained in the business world.

Like many small-business owners, Schmitt hoped that computers would bring greater efficiency to his operation, while preserving a craft that had been handed down through the family. But computerization didn't happen overnight; Schmitt experimented with both hardware and software to build the right system.

"We started with a Texas Instruments computer, but by 1980 we had outgrown it," he recalled. As more and more of the bakery's operations were automated, the business needed a machine with greater capabilities, so he turned to the Apple III. However, he had problems with the hardware so he bought a Commodore PET, but found it didn't meet his needs, either. When IBM announced its PC, Schmitt decided to wait for it. He bought one of the first PCs available in his area. Since the initial purchase, he has bought three more. Two of the PCs are used in the store in place of cash registers. The sales personnel punch in a code, which corresponds to the type of item and the price. The computer calculates the applicable tax, the total bill, and the change due. The printer produces a receipt. The computers also keep track of the various products and remind employees of their duties in other parts of the shop. The two other PCs are located in the company office upstairs from the shop. Both machines have combination clock calendars, printer interface and memory expansion cards, 320K disk drives, light pens, and a color/graphics boards.

> Some commercial programs are designed to be so flexible that they are neither easy nor fast to operate.

Schmitt has added a VOX board to upgrade one of the PCs to 14 megabytes. "I've written the programs so they can be run on floppies," he said. "I don't use the hard disk for original copy—it is more of a backup. If one machine goes down, I can run the program on the other machine on a floppy disk. This way, all of the programs can run on any of the PCs."

Programming for Baking

Finding the right software wasn't easy, either. When Schmitt began to computerize his business, he used off-the-shelf programs to handle accounts receivable and payable and other accounting procedures. However, he discovered that many of them did not adequately meet the needs of a small business.

"It's natural for commercial programmers to take the applications from large businesses—that's what they've done," he said. "Unfortunately, a small business can't really use them, or, it isn't economical to do so.

As an experienced computer programmer, Schmitt was not deterred by the lack of available commercial programs geared to his industry. He decided to write his own software, which could be tailored to the bakery's specific needs. He has written more than 60 programs in BASIC, which do anything from printing out recipes for each day's baking to making lists of how to decorate specialty cakes. According to Schmitt, he chose BASIC over COBOL or FORTRAN because it can be written quickly, and it can be compiled. Compiled programs execute quickly. While it is true that some of these functions could be performed by commercial programs, Schmitt believes that writing his own saved time and money.

There are also other advantages to customized programming. "Some commercial programs are designed to be so flexible that they are neither easy nor fast to operate" said Schmitt. "Part of what I expect from computers is speed. If a program doesn't run quickly, you've saved labor but thrown away the savings on the time spent operating it. Some programs are so user-friendly that they are cumbersome to use."

One problem that Schmitt remedied with his own software was slow printing speed. A commercial program he had used took 45 minutes to print checks because of pauses built into the software; his program, however, can produce checks as quickly as his Anadex dot-matrix printer can generate them. His accounting software consists of three programs chained together, and it handles tasks that once required 12 commercial programs.

The advantages of writing your own software are many, but most small-business owners probably don't have programming experience as extensive as Schmitt's. However, he believes that even a short, simple customized program can be helpful and he recommends at least giving it a try.

Schmitt has considered marketing his software but decided against it because each operation's needs are so specific. "Someone else using our programs would run into the same problems I had with the commercial programs," he explained.

With the right hardware and software in place, the store can get down to the business of baking. Schmitt's programs

include those for accounts receivable, bread recipes, cake recipes, and billing for wholesale accounts. He also uses programs for listing each type of decorative cake, determining price codes and one for tallying cake orders to determine quantities of ingredients.

Getting Down to Baking

Not every program is used every day, but most of them are central to the bakery's operations. When a customer calls in an order, the information is jotted down and later entered on the computer, where it is sorted by field (name, address, telephone number, type of order, price, and so forth). For example, this system allows you to examine all chocolate sheet cake orders at one time. At the end of the day, the telephone orders are combined with those from the wholesale customers (the bakery also sells some of its goods to supermarkets), and with the order of goods to stock the store. The computer will develop a recipe from this information, using another program.

Using this information the computer or an operator can decide to make, for example, 110 pounds of white bread loaves. The computer then creates a recipe and determines quantities for the necessary ingredients. In this case the recipe calls for 1.72 pounds of yeast, 5.43 pounds sweetened and condensed milk, 34.02 pounds of water, 64.25 pounds of flour, 9/10 pound of diamalt, 1.27 pounds of salt, and .72 of a pound of shortening. If prepared sweetened and condensed milk is unavailable, the computer automatically includes a recipe for it. It also provides other helpful hints for preparation. For instance, the program knows that flour comes in 100-pound sacks, so, in addition to calling for the required 64.25 pounds, it will note that you can simply remove 35.75 pounds of flour from the 100-pound sack. The recipe includes more than one set of mixing directions, each geared to a different machine in the bakery. The program specifies how long the mixing procedure will take, according to the machine used. A printout of the recipe is given to each baker when he begins work. For cakes or specialty items, the program will provide a decorations list along with a cake recipe.

"One of the biggest problems we had in the past," said Schmitt, "was misfiling of orders. A customer who had ordered a cake would come into the store, and we wouldn't have the cake ready—a sure way to damage your reputation. With the computer we print a list for the decorators each day, and all of the cakes are decorated to order.

"This is a prime example of the computer's value," he continued. "Management becomes easy when you have an alphabetical list of the cakes than have been ordered for a particular day. Without a computer, preparing a list like this one is such a time-consuming, tedious activity that many small businesses don't take the time to do it."

The Deerfield Bakery uses its PCs to keep track of more than 700 different confections and about 1,000 designs for cakes, which can cost up to $300 to $400. It also offers 18 different types of bread ranging from plain white to zucchini. In addition, each type of bread is available in a number of forms, such as muffins, loaves, and rolls. Each form requires a different proportion of ingredients. On a typical day the bakery will make from 30 to 40 different doughs. "When you include cake fillings, icings, and garnishes, you use more than 50 ingredients," said Schmitt. "It used to take up to 2 hours to manually total the next day's needs and then calculate the quantities. With the computer the process moves as quickly as punching the keyboard."

Ice Cream Making

The PC helps with more than just baking in this business. Last year the Deerfield Bakery began making its own ice cream. According to Schmitt, this process is more complicated than baking.

"One of the things about making ice cream is that the balance of cream, fat, and sugar is very important. Varying the

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CIRCLE 252 ON READER SERVICE CARD

amount of any one of these ingredients will change the amounts of the other two. It's like solving three equations with three unknowns. The computer has helped us work out a recipe. The hard part is finding the balance. Actually it's more than just solving three equations; you have to keep solving them over and over again."

Another facet of the bakery's operation that has been computerized is the labeling of packages. By law, most baked goods sold at retail outlets such as supermarkets must be labeled so that consumers can read the list of ingredients. Since the Deerfield Bakery sells products through supermarkets, it has to label products. This process was time-consuming and expensive before it was automated. With another of his specially designed programs, Schmitt now prints the labels with the computer.

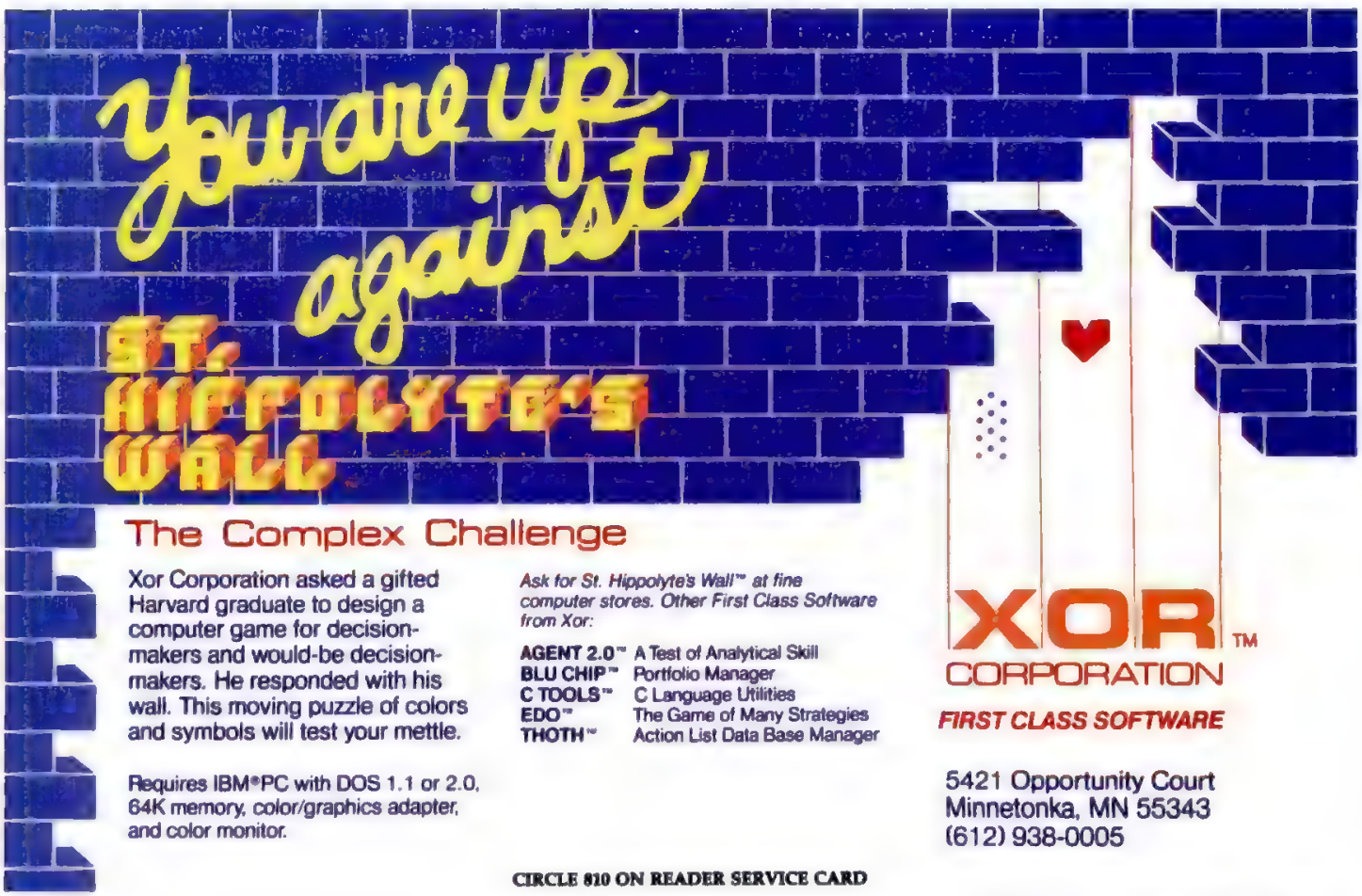
"Without a doubt, the PCs have paid for themselves, said Schmitt. "The savings have certainly paid for the hardware, but it's harder to determine whether it has paid for the programming time."

Spinning the Wheel

The key savings have resulted from the labor percentage program. The products are divided among eight categories at the cash registers. By using these divisions, Schmitt can watch which goods are selling and decide how much manpower he needs to produce the specific products. Working hours can be adjusted to save money. Additionally, there are seasonal requirements. November and December, the holiday season, tend to be heavy times while January tends to be slow.

Schmitt has also developed a Lotto-type of game designed to reward sales people. When a sales person deserves recognition say, for handling a difficult customer particularly well, a supervisor will load the reward program. On the screen, various numbers appear to be spinning. The employee pushes a key to stop the rotating numbers and wins the prize that corresponds to the number on the screen. The prize might be a $10 bill or a chocolate cake.

In spite of the computer, some things haven't changed much since Schmitt's great-grandfather ran the bakery in Germany. "Actually some of the recipes are the same ones he used," said Schmitt. "The most important thing in baking is the quality of the recipes. After that, it is how things are done." With or without computers, baking is still a craft. The craft lies in the handling of the dough. And at the Deerfield Bakery the handling of the dough is still there. ■



CIRCLE 810 ON READER SERVICE CARD

Removable Hard-Disk Drives: A Workable Alternative

The Genie and Tecmar removable hard-disk drives use two novel approaches to the same problem. Does one perform better than the other? PC tested to get some answers.

Genie 5+5
Genie Computer Corporation
31125 Via Colinas, #908
Westlake Village, CA 91362
(213) 991-6210
List Price: $39.95

CIRCLE 690 ON READER SERVICE CARD

Cartridge Winchester in PC
Tecmar, Inc.
Personal Computer Division
6225 Cochran Rd.
Cleveland, OH 44139
(216) 349-0600
List Price: $17.95

CIRCLE 689 ON READER SERVICE CARD

The distance between promise and reality of products in the personal computer field is great. Between the two lies a nearly endless trail of prototypes, alpha, beta, and gamma tests—and often a trip back to the drawing board—because all too often a personal-computer promise is just a flight of someone's imagination.

About a year ago, I previewed the promises of the latest technology in mass storage for the IBM PC: removable-cartridge Winchester hard-disk drives (see "Hard Disks Made Easy," *PC*, Volume 1 Number 10). At that time, although promises of these products abounded, prototypes were scarce. Suppliers of IBM PC peripherals were still trying to decide which of two competing removable-cartridge, hard-disk systems was better. I saw some models work, heard tales of others, and tried to find the hard truth at the center of the developers' fluff.

Test Models Arrive at PC

In the intervening months, however, the machines have become more readily available and the products' specifications have finally gelled. At last, genuine production versions of removable-cartridge, hard-disk drives using two competing and mutually incompatible storage formats

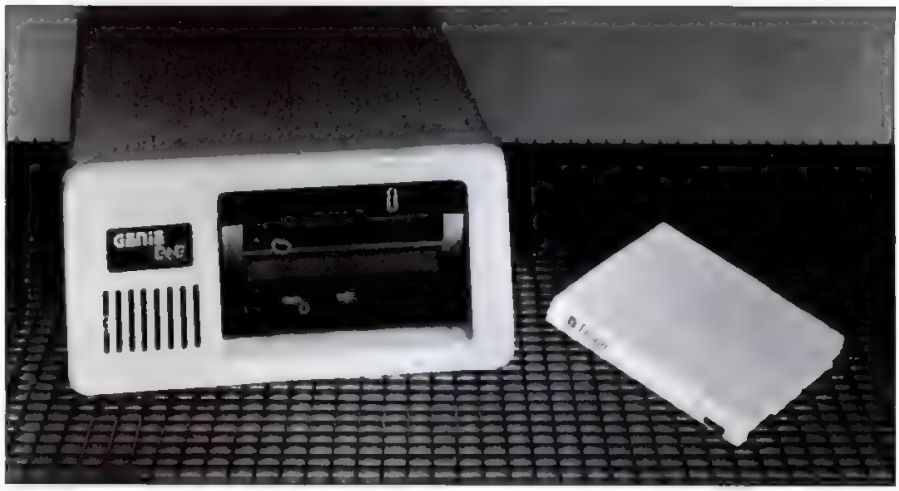
arrived at the *PC* magazine offices—the Genie Computer model 5+5 and the Cartridge Winchester in PC. Although for the most part they are alike in function, the Genie and Tecmar removable hard-disk drives are worlds apart in approach and realization. The Genie uses a hefty, white plastic cartridge that contains a nearly conventional Winchester-style hard disk 5¼ inches in diameter. (In the Genie, the removable-cartridge, hard-disk drive is a companion to a more common nonremovable drive of the same size and capacity in the same chassis.) The other format, used by Tecmar (among others) for a series of drives, has a smaller gray cartridge with a 100-millimeter (3.9-inch) disk on the inside.

The models received for review were even more diverse in their outward appearance. The Genie came installed in a miniature IBM PC chassis that was identical in color, height, and styling to the standard IBM system unit. The Tecmar arrived as a tiny drive, smaller and lighter than a standard IBM floppy-disk drive. Unprotected by any shell, the Tecmar model received for testing was designed for direct installation into the IBM PC systems unit, like the Winchester disk that comes built into the PC-XT.

Why Removable Hard Disks?

• For purveyors of fine hardware, the concept of a removable-cartridge Winchester might seem to be a contradiction in terms. Everyone knows that a Winchester uses a delicate mechanism that must be protected from the elements by an airtight chamber. And besides, Winchesters of the nonremovable sort work fine—why bother complicating things with cartridges that can be lost or abused?

Whatever the possible complications, the removable-cartridge Winchester does have distinct advantages. A Winchester hard-disk drive, as found in the IBM Personal Computer XT, is both faster than the traditional personal computer mass-storage device (floppy disks) and has a much greater storage capacity.



The Genie 5 + 5 removable hard-disk drive.

On the negative side, every bit of data you write on the hard-disk surface, every file you store in its dark corners, every dollar you tuck away from the auditors on your electronic balance sheet, is invariably locked up inside the conventional Winchester's hermetically sealed case.

There shouldn't be anything wrong with this—whenever you need your data, they should be there. But, the fact of the matter is that every byte of the 10 million you stuff on your hard disk is just a DOS command away from oblivion.

Although Winchester technology has advanced to the point where the chances of a drive failing are called "remote," Winchesters can and do fail. Heads crash, sectors go bad, and some suffer even worse fates—thieves steal entire computers without any regard for your data base that is locked up inside, and fires destroy businesses and along with them, computers. In some cases, insurance will pay for the hardware loss, but no insurance can pay back the time lost trying to recreate 10 megabytes of memory.

The solution to such problems is prevention. Always keep a copy of any important file and make backups.

When you are dealing with 10 megabytes, however, making a backup is easier said than done. Backing up every file on a hard disk with the alternative offered on the XT (for instance, floppy disks) can take an hour each day. Consequently, it's little wonder that dozens of peripheral suppliers offer hard-disk backup devices more diverse than Noah's menagerie—streaming tape drives, floppy-disk jukeboxes, and removable-cartridge Winchester disks.

Of the three, the cartridge Winchesters are the most intriguing—not only can they be used for primary storage as well as backing up other Winchesters, but they are contrary to some basic notions about Winchesters.

Minor and Major Irritations

Winchester disk drives have earned a reputation for being delicate devices. Their fragile read/write heads fly microinches above the surface of a rotating, high-speed disk. The gap between head and disk is so small that the tiniest piece of dust rises like a boulder. Should the head slam into one, invariably the result is a "head crash," which scratches the relatively soft surface of the disk, destroying the data stored there. The classic solution has been to build Winchesters in clean rooms and seal the drive away from dust.

A removable cartridge presents problems. If the disk drive is sealed, getting a cartridge in and out is more than a minor irritation. And once you solve the problem of loading and unloading the cartridge,

you have to provide some way for the head, a necessary part of the drive, to get inside the removable cartridge. Keeping dust out of a removable cartridge is like trying to build a dam out of window screen.

The biggest difference between the two, removable hard-disk drive mechanisms is the antidust philosophy. The 5¼ inch system used in the Genie is built with proven Winchester technology, an oxide-coated hard disk. The soft, oxide surface is protected from the damages of dust (and other contaminants) by vacuuming out the inside of the cartridge when the unit is running and keeping dust out with a stream of filtered air.

The 100-millimeter system, as adopted by Tecmar, uses a new hard disk that is plated with a tough, magnetic-phosphor layer for recording data. The plating is so hard that an occasional intruding particle won't do any damage.

Other differences are readily apparent, too. The disk cartridge used by the Genie system is perceptibly larger, sized identically to a traditional 5¼ inch Winchester drive. The cartridge used by the Tecmar drive, though seemingly only a fraction smaller at 3.9 inches in diameter, stores about one third the volume of the Genie.

Admittedly, however, appearances can be deceiving, and to most users performance is more of a guiding factor in equipment choice. Engineers can argue about stylistic differences all they want—but the people who have to use the things care about more mundane matters, such as: Do they work? Is one more convenient to use than the other? Does one have a practical advantage over the other? Is either system truly superior? The only way to answer these questions is to try both units, and so I did.

At The Starting Line

Each unit was installed simultaneously in the same standard IBM PC. However, for various reasons (including that the Genie requires using the DOS 1.1 version of the IBM operating system and the Tecmar requires DOS 2.0), they were not operated at the same time. The B drive of the PC was removed to accommodate the Tecmar unit. Neither unit demands extra memory over that required by the operating system and the program you wish to run. (For the record, 312K RAM was stuffed into this particular PC.)

A direct comparison of the mechanical installation of the two machines that were received for evaluation would be unfair. The Genie 5 + 5 is a standalone unit that requires only sliding a small circuit card into an expansion slot of your PC and plugging it into the auxiliary chassis of the disk drive. The Tecmar drive, designed to be installed in the B disk drive position of the main PC chassis, requires mounting the drive unit, adding an expansion card, and folding a lengthy, cobralike section of ribbon cable through your computer.

> For purveyors of fine hardware, the concept of a removable-cartridge Winchester might seem to be a contradiction in terms.

Ease of Installation

If you've ever installed an expansion card in your PC and have mastered the art of putting a cable connector in a socket, you can have the Genie 5 + 5 installed in about 2 minutes—maybe less if you've already lost the screws that hold your IBM PC together.

Tecmar told me that installing its cartridge drive is as easy as following a recipe. Well, maybe that's true if the recipe is for bouillabaisse, and you happen to be James Beard. Though the process only took a short while, it totally expended my supply of patience.

The first step was easy: Slide the drive unit into the empty "B" disk drive slot of your PC.

However, installing the Tecmar interface card in a vacant expansion slot was frustrating. The card fills the full length of the PC—no problem there—and its "slot cover" (that L-shaped piece of black sheet metal used for screwing expansion cards into the PC chassis) is mounted with a vague sort of swivel mechanism, presumably to ease installation. In fact, the swivel made sliding the bottom tab of the slot cover into the appropriate PC slot about as easy as threading a needle with a steel chain.

Aware that I may be uniquely blessed with a lack of dexterity, I asked *PC* staff editor Paul Somerson to give it a try, and, after a couple of minutes, several mumbled curses, and entirely removing the sheet metal piece, he had the card installed. (Note: The installed card wavered about without the slot cover's metal support, so I suggest that you bear with the frustration and install the card properly—or, better yet, have your dealer do it.)

The next step was to install the ribbon cable to connect drive and Tecmar board. I felt like I was losing ground—after finally getting the Tecmar card into place, I had to remove the IBM disk-drive controller in the adjacent slot to properly weave the wire through the machine. Actually, this step was faily quick and easy—even though I'm all thumbs.

In all fairness I must mention that Tecmar also sells this same drive and the belligerent circuit card already installed in an expansion chassis. Doubtless, it would be as easy to install as the Genie.

Physically installing a cartridge hard-disk drive is not enough. You have to convince your computer that you've done so. Both Genie and Tecmar take the same approach—they provide you with the appropriate software to run the additional drive and show your computer how to access it.

Both companies provide step-by-step installation instructions in their manuals that leave more than a little to be desired.

The Genie manual appeared to have been written by a dedicated BASIC hacker—it was loaded with the English language equivalent of GOTO statements. I had to bounce forward and backward through the Genie manual to figure out which step came next. All the information is there; it's just not organized in a fashion that helps a computer newcomer get his hard-disk drive to run.

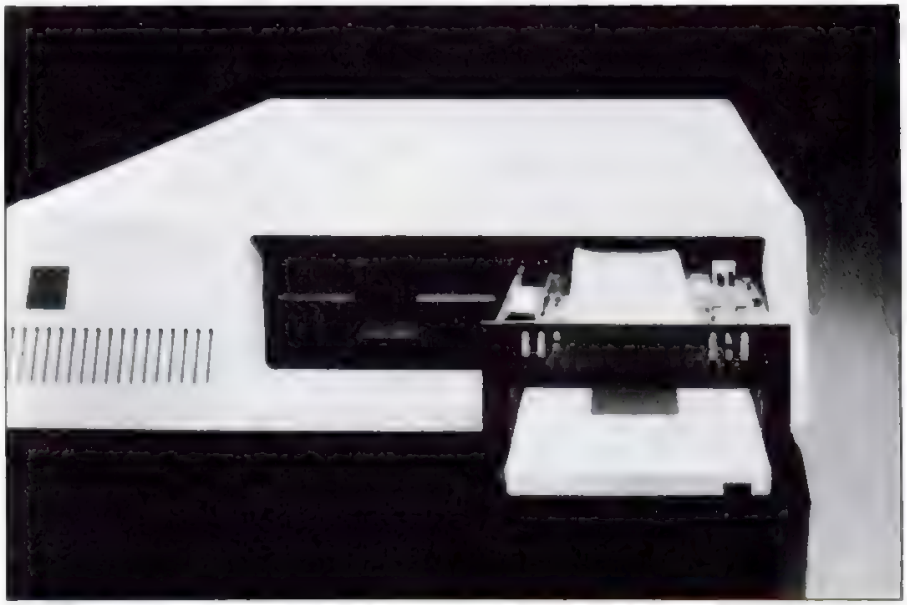
Please Explain

The installation of the Genie BIOS (basic input output system—the part of the disk-operating system that tells your computer exactly how and where to store and retrieve data) was presented in an easy-to-understand step-by-step fashion. But once you've got the BIOS ready, you're abandoned. You won't be able to use your Genie drive until you figure out what "volumes" are and how and why you must "assign" them.

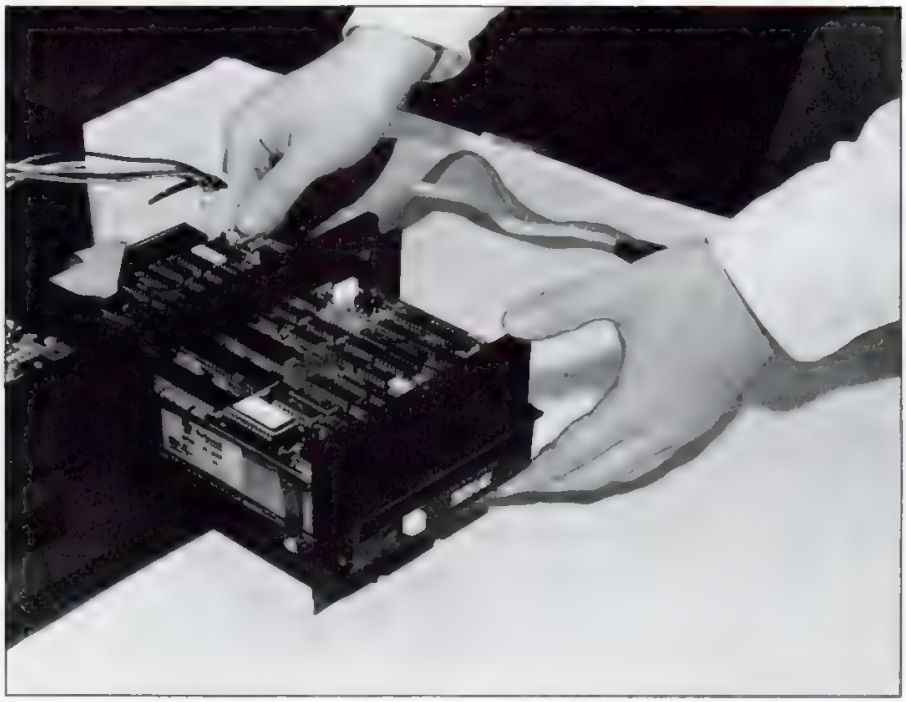
The manual leaps immediately into a description of functions available from their menu-driven system. It's a great reference but is less than helpful when you just want to get started. Since the Genie BIOS includes instructions for use with IBM's DOS 1.1, Genie should have assumed that its users have no previous experience with hard-disk operating systems and given them an overview of basic concepts.

It suffices to say that once you have the Genie BIOS up and running, you must format the hard disks (actually, the disks come already formatted, but the company suggests you do it again). Then you begin sorting your way through the menu (first, select Configuration) until you find the command that will allow you to initialize the drive. Then you divide each of the two hard disks in the Genie system into "volumes" using the "Allocate Volume" selection. Then you must assign a drive name to each volume using the ASSIGN command—which appears nowhere on the menu and must be accessed directly from the PC-DOS operating system.

Finally, you can pretend that each volume of your Genie is a separate disk drive and use all the PC-DOS commands that you are familiar with. Each volume can hold from 160 kilobytes (the size of a single-sided floppy disk) to the full 5 megabytes available on both the removable and nonremovable hard disks. Volumes are not merely numbered, but can have names up to 16 characters long. (I named mine after family members, male for one disk,



Tecmar's Cartridge Winchester in PC removable hard-disk drive.



Installing the Tecmar 3.9-inch removable cartridge Winchester in the PC is as easy as it is straightforward.

female for the other.) You can even choose what operating system you want each volume to use. The selection includes MS-DOS 1.1 (PC-DOS), CP/M-86, Concurrent CP/M-86, UCSD Pascal, and QUNIX.

Genie's menu system of hard-disk control is easy to use. Usually, computer users growl when they have to sort their way through layer upon layer of menus to get at the one command they want to use. The menu-oriented Genie hard-disk functions will likely be used at installation and rarely thereafter. And you probably won't object to the few referrals through layers of menus.

Data Safeguards

Genie has also gone to great pains to prevent the curse of the IBM hard disk—that inadvertent FORMAT command that appears when the hard disk is logged on and can send a full 10 megabytes on its way to oblivion. The format function in the Genie system, called initializing, requires that you double- and triple-check what you're going to do. Flashing prompts warn that you'll destroy everything. If you hit return to keep going, your PC will ask the equivalent of "Are you sure you want to do this?" If you continue, it asks, "Are you really sure?" And the coup de grace—you must type the complete word INITIALIZE to start the process. That's one function you can't start accidentally.

Other potentially destructive functions are similarly guarded with warnings. But all is not safe. The Genie menu gives you a choice of two functions called Release: one destroys an entire volume (potentially 5 megabytes) and the other merely takes a volume off-line without harming data.

The only other software irritation I encountered was with the ASSIGN command, which appends disk-drive identification letters to the hard-disk volumes. The manual indicates that merely naming the volume and assigning the drive letter is sufficient. This works well as long as the volumes are on the removable cartridge half of the Genie. However, if you want to assign a volume on the fixed disk, you have to specify which fixed disk by typing the characters 1F: in front of the volume name. When I failed to do so, I got an error message that the volume couldn't be found even though I knew it was there. It took me about half an hour of head scratching to figure out the problem.

If you invest in a Genie system, you'll soon become familiar with the ASSIGN command because your Genie drive assignment will vanish every time you turn your PC off. You have to reassign drive letters to each volume you want to use every time you turn on your computer. It's just another irritation you will have to deal with, because Genie's software engineers overlooked the problem.

> The Genie manual appeared to have been written by a dedicated BASIC hacker.

I had greater difficulties with the one-time installation process of the Tecmar drive. First, because it is not menu driven, I had to wade through their less-than-easy-to-understand manual. The booklet that came with the disk drive is a product of the "one-size-fits-all" school of manual design. It covers not just the particular model in question, but practically the whole Tecmar hard-disk line—which means a lot of superfluous reading.

Installing the Tecmar hard-disk software requires that you use the DOS 2.0 utility called EDLIN to create a file that tells the IBM operating system that the new hard-disk drive has been added. The instructions for creating a file are not written in the clearest possible language, but the process itself isn't too difficult. The entire file consists of one or two lines. You're bounced back and forth between pages to find out what commands you must include in the "configuration line," which is essentially the whole file.

When the proper file is created, you must copy the file and then reboot by turning the computer off and immediately back on. In an instant, the Tecmar system is up and running.

Next you must format the hard disk. The Tecmar system does not have as many layers of mistake protection as the Genie, but it requires you use a special command, TECFOR, which is used nowhere else and has special syntax that will probably prevent accidentally erasing 5 megabytes of your favorite files. A drive number is assigned to the volumes of the Tecmar hard disk when it is formatted, so the assignments remain immutable even if you switch off your computer system. You need not go through the process of assigning volumes every time you turn your computer on, as you must with the Genie.

Although the Tecmar disk took longer to format, 4 minutes, 22 seconds versus the Genie's 3 minutes, 26 seconds, the Tecmar was a bit more reassuring and gave a sector-by-sector progress report.

The Final Tally

Once either hard-disk subsystem is installed, the in-use results are about the same as those from the Genie. The Tecmar hard disk became drive C, working exactly like the hard-disk half of the XT running DOS 2.0. The Genie, running DOS 1.1, also performed flawlessly.

Using either drive was as simple as routing things to a different drive letter. From the software point of view, you would never notice anything different about these hard disks.

Either of these drives make using nearly any program, particularly those that depend heavily on disk access, more enjoyable. *WordStar*, for instance, loaded off either disk cartridge in just a fraction over 1 second.

Objective speed measurements of the two drives proved to be somewhat contradictory—the Tecmar was faster when called upon to repeatedly write a file (20

WRITING TEST 1	
(10 repetitions of 20 records 1024 bytes long)	
Standard IBM floppy disk	2 min, 40 sec
Genie "fixed" hard disk	0 min, 21 sec
Genie removable hard disk	0 min, 21 sec
Tecmar removable hard disk	0 min, 17 sec
WRITING TEST 2	
(100 repetitions of 20 records 1024 bytes long)	
Genie "fixed" hard disk	3 min, 10 sec
Genie removable hard disk	3 min, 12 sec
Tecmar removable hard disk	2 min, 50 sec
READING TEST 1	
(10 repetitions of 20 records 1024 bytes long)	
Standard IBM floppy disk	1 min, 20 sec
Genie "fixed" hard disk	0 min, 09 sec
Genie removable hard disk	0 min, 09 sec
Tecmar removable hard disk	0 min, 10 sec
READING TEST 2	
(100 repetitions of 20 records 1024 bytes long)	
Genie "fixed" hard disk	1 min, 28 sec
Genie removable hard disk	1 min, 27 sec
Tecmar removable hard disk	1 min, 47 sec

Figure 1: *Comparative reading and writing speeds of the Genie and Tecmar removable cartridge Winchesters.*

records, 1024 bytes long); the Genie was faster repeatedly reading the same file (see Figure 1). The differences don't appear to be significant, particularly when compared to IBM floppy disk performance—either hard disk is ten times faster than the floppy disk.

The substantial differences between the two cartridge formats and design philosophies become apparent when surveying the mechanics of each disk subsystem.

The Genie subunit, with its bigger drive and heftier mechanism, has a solid, heavy feel to it and easily fits the cliché "built like a battleship."

Flick the switch to turn it on, and you'll be greeted by a vacuum cleaner-like whoosh. It's much louder than the PC's fan and might prove objectionable when working in close quarters. The noise is of course necessary—the airflow keeps the disk within the cartridge free from contaminants.

The tiny Tecmar drive, a half-height unit that has been adapted to fit in the full-height "B" drive slot by a black, anodized, brushed-aluminum panel, is hardly audible above the PC's own internal fan. Disk access is even quieter than the Winchester aboard the XT.

Hard Disk Protection

The protection afforded the disk within the cartridge is a major difference between the two drives. The Genie goes to great lengths to protect their platter from any damage you might do. Your access to the disk is limited by several interlocks. The door that allows access to the cartridge can be opened only when power is on to the Genie drive, and the motor for the removable-cartridge drive is stopped.

The front panel of the Genie features two LEDs to control such functions and tell you what's going on inside. A green LED illuminates when the drive is running at proper speed, and flashes as it comes up to speed and coasts down to a stop. A red LED lights to show when the drive is active. One rocker switch on the front panel controls the motor of the removable-cartridge drive, turning it on and off so that the cartridge can be removed. Another rocker switch "write protects" the nonremovable Winchester portion of the subsystem.

Changing cartridges on the Genie is something of a ritual. Flick the switch, wait for the green LED to stop blinking, push the tab that unlatches the door, and finally remove the cartridge and insert the next one and repeat the process.

The Tecmar unit does not go to such great lengths or use such elaborate controls to protect its hard disk. In fact, the entire control panel consists of one white square pushbutton that unlatches the access door to the cartridge. (No need to switch the drive motor on and off—it comes on automatically when the cartridge is inserted.) The door is in no way interlocked—you can press the button at any time, even when the drive is reading or writing data.

Being in a somewhat devious mood, I pressed the button while the Tecmar drive was busily copying a file. The door popped open, and the cartridge ground and growled at me so loudly I figured both disk and drive had bitten the dust. Merely out of curiosity, I tried to reformat the disk to see how much damage there was, and where. There was none. I gained a new respect for sturdy simplicity.

The grinding sound will soon become familiar to you once you install a Tecmar drive. Every time you open the door to access the cartridge, it will echo through your office. A noise like that would seem to imply that something was being damaged. However, my brief test gave no indication of where damage occurred or whether it would cause problems in the long run.

Of course, popping out the disk when it is in use can have detrimental effects on your software as well as your hardware. I tried it, and the PC displayed a Tecmar error message that said the drive was not ready yet. Merely reinserting the disk (and letting it come up to speed) brought about

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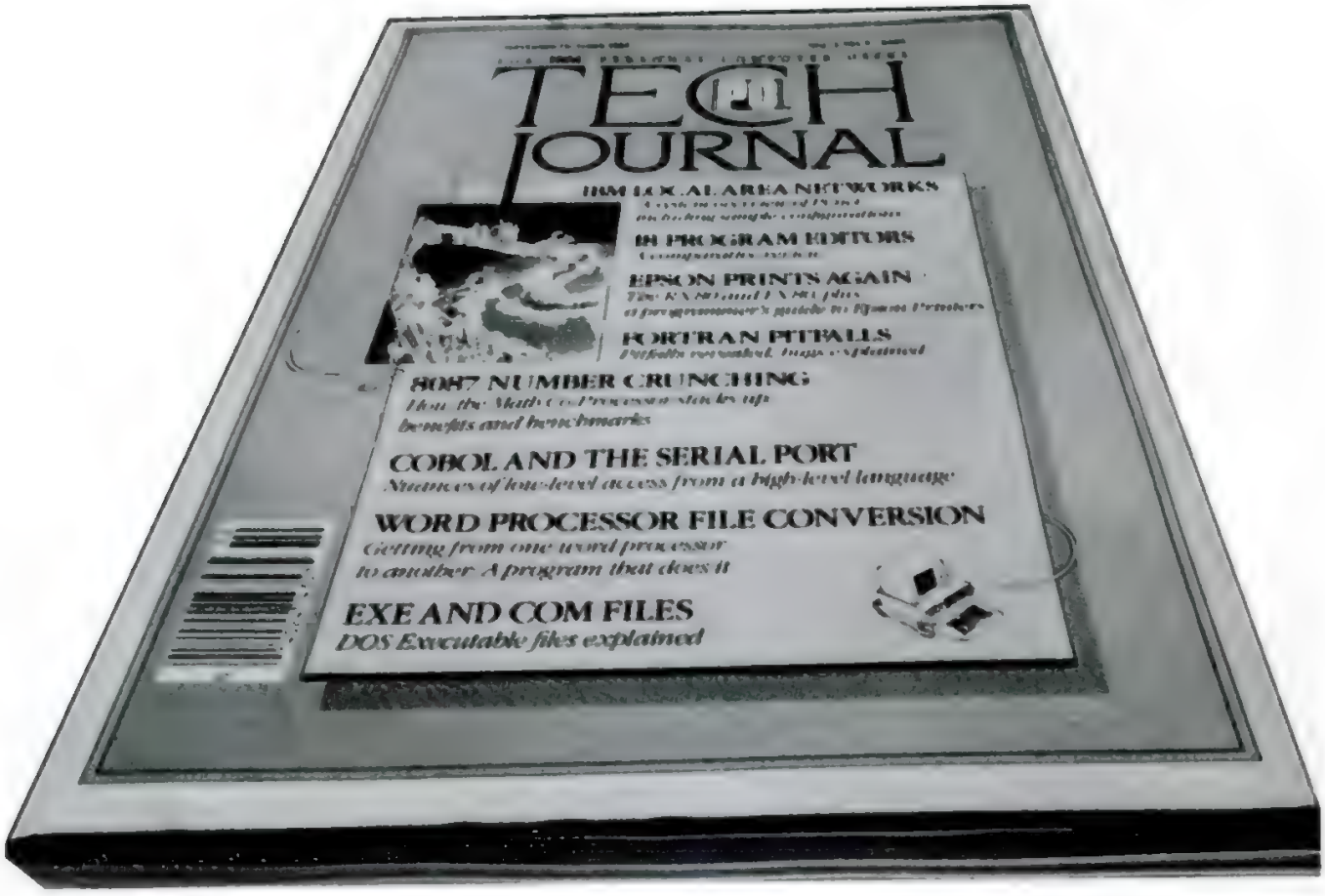

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CIRCLE 174 ON READER SERVICE CARD

a complete, unaided recovery.

Later when I was playing with the Tecmar, I managed to cause an error that the computer did not recover from—the screen projected something like a "loss-of-vertical-hold" display of an error message. Only flicking the PC off and on again would clear the screen and bring it to

Both removable cartridge Winchester hard-disk drives work quickly and conveniently to save your data.

a stop.

Peering down the throats of both units also revealed design differences. When the cartridge is removed from the Genie, its read/write heads go into hiding, safely locked away from dust and damage behind a door. The heads in the Tecmar hang wild and free inside the drive. Opening the Tecmar drive door spreads them wide apart for cartridge insertion. Although the heads looked vulnerable suspended in space like that, they're probably safe. They were far enough back to even be out of reach to my prying fingers.

Two Winners

Both removable cartridge Winchester hard-disk drives do what they promise—they work quickly and conveniently to save your data. The two models tested are not directly competitive: the Genie offers a standard 5-megabyte hard disk with a 5-megabyte cartridge drive as a backup bonus, while the Tecmar drive is designed to be used as an inexpensive primary hard-disk drive that serves as its own backup. (It costs less than many conventional Winchesters of equal size.) Although the two differ in size, robustness, and philosophy, either one would be a good, workable choice for mass-storage. ■

Faster Than A Speeding Cursor Key

. . . more powerful than a blazing light pen, able to leap full spreadsheets in a single bound, the mighty LogiMouse from Logitech is a powerful addition for your PC.

If you are tired of sitting at your PC waiting while your cursor ambles across the screen, maybe you need a mouse—not a live one, but an input device that you roll across your desk to speed up the cursor's movement on your screen. Its possible applications range from text editing to graphics.

LogiMouse
Logitech, Inc.
165 University Ave.
Palo Alto, CA 94301
(415) 326-3885
List Price: LogiMouse P4, $375;
LogiMouse P5, $268
Requires: No interface card needed.

CIRCLE 726 ON READER SERVICE CARD

Logitech, Inc. offers two such devices: the LogiMouse P4 and P5, which are fully programmable, three-key mice designed to operate with the PC. They use a combination of mechanical tracking and optical decoding for precise cursor control and high reliability. Best of all, they are completely self-contained units that can be plugged right into any IBM PC without system modification of any kind.

Unlike the more common "RS 232" mice that require a serial port, each LogiMouse comes with its own adapter box (see Figure 1) that plugs into the keyboard jack on the back of the system unit. The keyboard itself is then plugged into the adapter box which, in effect, becomes an extension of the keyboard attachment cord. The 4-foot LogiMouse cable is plugged into the adapter box, and installation is complete, all in about 30 seconds.

This interface method has other benefits besides quick installation. Since LogiMouse sends its cursor-control signals directly to the keyboard jack, it avoids all the possible interfacing problems of RS-232 mice. So far, no other manufacturer has used this clever interface technique.

Though they differ considerably in appearance, the operating characteristics of the two models are virtually identical. Logitech, which introduced the P5 more recently, claims that its simpler design makes it more durable. It is also cheaper to manufacture, and Logitech passes on the savings by selling it for more than $100

less than the P4. Logitech expects to sell more P5s than P4s, but the older model has a loyal following and will be produced as long as a demand exists.

You operate the LogiMouse, like all computer mice—by moving it around on a smooth surface. A steel ball, about an inch in diameter, is mounted within the mouse and protrudes slightly from the flat, lower surface. As you move it, the steel ball turns, and its motion is translated into cursor-key strokes. Thus, if you roll the mouse in the same direction as the right arrow key (number 6 on the keypad), the little beast will send a series of cursor-right key strokes as long as it is in motion.

LogiMouse has its own built-in electronic x and y axes, and it transmits cursor-up or -down signals along the y axis and cursor-right or -left signals along the x axis. If you roll the mouse in wavy lines, say, or in a circle, it will break out the x and y components of the movement and send an appropriate series of both vertical and horizontal cursor-control signals.

In its default power-up setting, LogiMouse sends your PC 12 right or left cursor-key strokes for every inch of horizontal (x axis) motion and six up or down cursor-key strokes for every inch of vertical (y axis) motion. This means that in a screenful of 80-column text, you can move the cursor from one margin to the other, or from the top of the screen to the bottom, by rolling the mouse about 6½ inches. The faster you roll the mouse, the faster the cursor will move, and it will soon be clear to you that LogiMouse's signals are processed much more rapidly than keyboard input. In the default setting, LogiMouse can move from the beginning to the end of an 80-character line in about a second. You can do the same thing by holding down the right-arrow key, but it takes about 7½ seconds.

If you want to gain more control over the cursor, you can use the Logitech software that comes with the mouse. It can be used to change the number of cursor movements generated by every inch of roll (see sidebar, "Mighty Mouse's Technical Specs"). LogiMouse can easily be programmed to transmit from one to 100 cursor movements per inch.

Figure 1: *Top, the LogiMouse interface and adapter box. Left, LogiMouse P5, the newer, less expensive model. Right, LogiMouse P4, the older model, which has a loyal following.*

One hundred per inch is plenty. At this rate, the cursor is flying around so fast you can hardly see it, much less put it where you want it. And the mouse is sending out so many signals that it can quickly overload the keyboard buffer and give you that screech from the system unit speaker that means it's choking. At fewer signals per inch, you gain better control over the cursor, but you have to roll the mouse farther. Both the scaling factors (the x and y signals-per-inch ratios), can be programmed independently of each other. With a little experimentation you can find the combination that's best for you.

A Few Surprises

Since LogiMouse's signal is a faithful imitation of a cursor keystroke, it can lead to surprises. In a page of text, for example, if you are moving from the right margin to the left and overshoot by just enough to produce one more left-arrow signal, the cursor will end up back at the right margin but on the line above. This happens because a left-arrow keystroke at the left margin will always take you back one character, to the end of the previous line. The same thing happens if you overshoot going the other way, only you end up on the line below. The novice mouse jockey is a little like Columbus, going east by sailing west.

LogiMouse's behavior in DOS is another surprise, though it's perfectly logical. In DOS, the right-arrow key repeats the previous command, character by character. Sure enough, LogiMouse does the same thing. Roll it to the right, and you will get your last DOS command. Roll it back, and the command will disappear.

LogiMouse doesn't care how your program uses the cursor control keys; its motion is translated into whatever those keys are supposed to do. If you are running some weird package that prints the message, "Hi there, sweetheart!" on the screen every time you hit the left-arrow key, moving the mouse to the left will print a screenful of messages.

However, LogiMouse does care how you use its three keys. In the default power-on state, the left key is the equivalent of F8, the middle key is F9, and the right key is F10. The same Logitech software that

controls the scaling factors can be used to program the keys.

You may want to program LogiMouse in a variety of ways for different applications. Specific function key assignments can be combined with appropriate x and y scaling factors to suit any program. You can store the results in a data file and call them up when you need them.

For word processing, for example, you might want to retain the default scaling factors but program the keys to delete the word above the cursor, align the paragraph the cursor is in, or toggle between insert and overwrite modes. You are limited only by how much you can accomplish in eight keystrokes. If you use LogiMouse along with a keyboard customizer like *ProKey*, you can produce a torrent of text or a whole series of commands with each mouse key. You could even store several sets of mouse parameters for word processing and call each one up according to the kind of editing you were doing.

When you use LogiMouse with a spreadsheet, you might want to reset the scaling factors. In spreadsheets, the arrow keys usually move the cursor by cell rather than by character, so you probably wouldn't need so many horizontal signals per inch. Again, you could program the three keys with whatever commands you found most useful, such as blank out a cell, enter its contents, or perform a calculation.

Shake, Rattle, and Roll

If LogiMouse does have a flaw, it is in the mounting mechanism for the steel ball. The ball is not held tightly, but rattles around inside the mouse if you pick it up or turn it over on its back. Logitech defends this loose mounting design, claiming that it prevents LogiMouse from sweeping up lint from your desktop. That may well be, but it also means that the mouse cannot be picked up without shaking the ball and generating a signal. Unless the scaling factors are set very low, the cursor will bounce each time you reposition the mouse.

Aside from this occasional irritation, the LogiMouse is everything a mouse should be. It works on any flat surface, rough or smooth, and leaves no marks. It fits comfortably in the hand, and the keys are nicely positioned. Its cord is long enough to give it running room but not so long that it gets in the way. It even comes with adequate documentation. In short, for those tidy people who actually have a smooth, clear surface next to their PCs, LogiMouse is a hard product to beat. ■

Mighty Mouse's Technical Specs

This deceptively simple input device has some sophisticated hardware.

LogiMouse's hardware is reasonably sophisticated. The motion of the mouse is picked up by the steel ball and transmitted to two rotating shafts that detect x/axis and y/axis motion. Rotation of the shafts is then optically decoded by phototransistors rather than through a direct electromechanical link. Optical decoding permits precise detection of movement and is considerably less likely to lead to failure than systems that require a direct, physical decoding link to an electrical device.

The decoding system within LogiMouse actually operates at a high resolution of 381 signals per inch of roll for the P4, and 200 signals per inch for the P5. This is the only real technical difference between the two models, but it does not result in different performance. In both cases the signal count is cut to 100 per inch by the adapter box so as not to swamp the PC's microprocessor with too many signals.

The reduced count of 100 signals per inch can be modified by using the Logitech software. LOGIMATE.EXE is a 12,000-byte program that is invoked to modify the x and y scaling factors and to program the function keys. A typical LogiMate command, entered from DOS, might look like this:

```
LOGIMATE X 20 Y 10 L 59 M 60 R
61
```

The numbers that appear after the X and Y are the values that modify the scaling factors. Dividing these numbers into 100 allows you to ascertain the signals-per-inch count. This command would therefore set the horizontal signals-per-inch count to five (100/20) and the vertical signal count to ten (100/10), and would program the left, middle, and right mouse keys to function as F1, F2, and F3, respectively. The numbers for these keys, 59, 60, and 61, are the appropriate scan codes, which are taken from a chart that is included with the LogiMouse documentation.

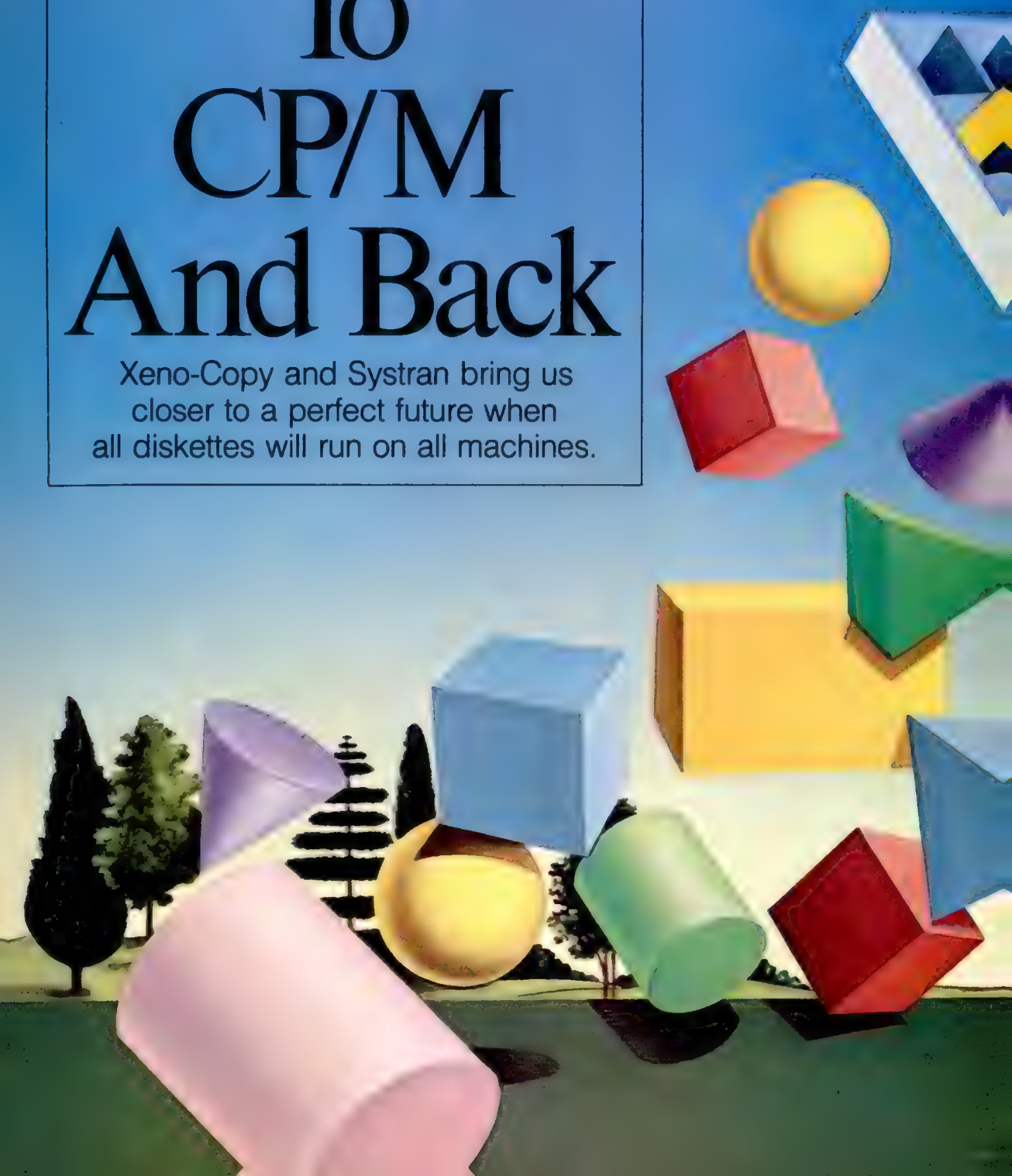
If you wanted to use this setting often, you could save it in a LOGIMATE.DAT file under whatever name you chose. If you saved it as TEST, for example, you could invoke the setting simply by entering the command LOGIMATE TEST from DOS, so long as both the .EXE and .DAT files were on disk. Pretty simple.

Another nifty feature is that any given software setting will survive a Ctrl-Alt-Del reset unscathed. Logitech manages this trick by storing each new LogiMouse setting in a memory chip within the LogiMate adapter box instead of in system RAM. Power down/power up will, of course, wipe out the setting and return LogiMouse to default mode, but a warm boot will not because it does not interrupt the supply of power to the adaptor box. This means that you can switch from one operating system to another or completely reconfigure your system memory without disturbing the most recent LogiMouse settings. —J.T.

SOFTWARE/RICHARD N. AARONS

To CP/M And Back

Xeno-Copy and Systran bring us closer to a perfect future when all diskettes will run on all machines.



The documentation writers at Vertex Systems couldn't have said it better: In the manual for *Xeno-Copy* they write: "In the Old Testament, man's excessive ambition results in the Tower of Babel where no one speaks the same language. In modern times, the microcomputer industry seems to have achieved the same result without any direct divine intervention. There are currently dozens of different disk formats being used by various microcomputer systems. And, of course, few of them are interchangeable. . . ."

This situation is becoming an increasing and sometimes vexing challenge as new machines and formats are released. It is paradoxical that we should find ourselves with a profusion of floppy formats when the original purpose of the floppy disk was to simplify file transfer from machine to machine. But few things work out exactly as designers hope.

Several software designers have turned their attention to the challenge of making diskettes created on one computer work on another, alien machine.

Xeno-Copy is currently a one-way transfer program. It moves ASCII and binary files from diskettes with alien formats to PC-DOS formatted diskettes.

It's best to think of *Xeno-Copy* as a read-only system. It reads a file from a disk created in any of the formats shown in Figure 1, displays the contents of the file on the monitor, and then copies the file to a PC-DOS formatted disk or displays and copies simultaneously.

Xeno-Copy cannot copy a file from a PC-DOS formatted disk to an alien format, nor can it format a disk to an alien specification. However, a new Vertex system called *Xeno-Copy Plus*, just out and not yet available for review, will enable you to make copies in either direction.

Reading alien diskettes is a vastly complicated business from a programming standpoint, but *Xeno-Copy* and its 40 page documentation are truly elegant in their simplicity. File transfers require only three or four user actions. First, PC-DOS is booted and *Xeno-Copy* is loaded into memory. Once loaded, the *Xeno-Copy* disk is removed from its drive, leaving all system drives available for the transfer process.

After loading *Xeno-Copy*, you are presented with three menus. The first sets options that will be in effect for the entire session unless you change them. The system needs to know whether it's running on a PC or an XT, the designation of source and destination drives, the number of permitted read retries, and whether to display the file contents or suppress the copy function.

The Heart of the Program

The next screen, called the NewDisk Menu, is the heart of the system once operation is underway. This menu enables you to return to the Options menu to change disks or any other default item, to tell the system that you are inserting a new alien disk in the source drive (similar to the "warm boot" function of CP/M), or to go to the Machine menu, which enables you to tell the system which format to expect in the source drive. All three menus allow simple numeric selection or function key responses. Appropriate function key responses are displayed in a reverse video status line at row 25.

You select the default drives, tell the system what type of format to expect in the source drive, and then answer a query for the file or files to be copied. The response can be a single file name, a valid DOS file specification using the DOS "?" and "*" wild cards, or two conditional wild cards, "!" and "#" respectively. When the conditional wild cards make matches, you are asked if you want the file copied. This is a handy feature, one I'd like to see in DOS.

Once the file or files are entered, *Xeno-Copy* goes to work and transfers the requested files from the alien source disk to the destination PC-DOS disk. If you want to make more transfers, you can then insert a new source disk and change any parameters you wish in the Options or NewDisk menus.

Name Your Drive

As stated earlier, you can name either disk drive as "source" or "destination," except in the obvious case of the single-floppy/hard-drive configuration in which the floppy drive must be the source. This ability to name the source drive and to state the number of read attempts is important because of the alignment and speed differences that can exist between the machine used to create the source disk and the PC drive used to read that disk.

If drive speed and alignment in the PC and the machine used to make the source disk are all to factory specs, there will be no problems—*Xeno-Copy* will read the foreign disk in the PC source drive without difficulty. However, if either machine is out of tolerance, or if tolerance errors start lining up unidirectionally, *Xeno-Copy* may need to make a few passes at the source disk to read it properly. If the reread attempts fail, the user can try naming the other PC drive as the source drive with the hope that its tolerances will provide a better match for the foreign diskette.

Xeno-copy
Vertex Systems
7950 W. 4th Street
Los Angeles, CA 90048
(213) 938-0857
List Price: $99.50
Requires: 64K RAM under DOS 1.1 or 128K RAM under DOS 2.0, two floppy disk drives or one floppy drive and one hard disk.

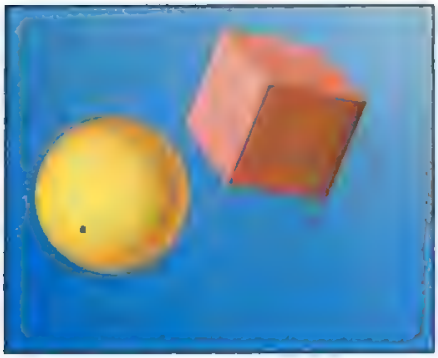
CIRCLE 727 ON READER SERVICE CARD

Systran
CompuView Products Inc.
1955 Pauline Blvd., #200
Ann Arbor, MI 48103
(313) 996-1299
List Price: $120
Requires: 64K RAM, CP/M-86, two disk drives.

CIRCLE 728 ON READER SERVICE CARD

Illustration: Oriesbach/Mantucci

I tested *Xeno-Copy* by transferring text and binary files originally created on an Epson QX10 (with both early and recent CP/M and Valdocs), a Kaypro II (SSDD) and on two different IBM PCs using the IBM and DR releases of CP/M-86. In each case the transfer worked perfectly



Xeno-Copy and its documentation are truly elegant in their simplicity.

even though drive B in my machine is known to have problems on the inner tracks of side one.

This product does, with minimum fuss, precisely what its marketers claim. Errors, when they occur, are most often source read problems and they are reported to the user through the floppy disk controller (FDC) error code. FDC error codes are fully explained in the documentation, along with suggested remedies.

The excellent documentation is provided in an IBM-size, hard-cover plastic folder, but the pages are drilled to fit into an IBM-format binder.

Xeno-Copy Plus, which, according to the manufacturer, will enable you to write to foreign diskettes, is expected to list for $149.50. The current version of *Xeno-Copy Plus* will support 24 alien formats; more are to be added in later versions.

The Systran System

CompuView is best known in the consumer marketplace for its highly successful text editor, *Vedit*. However, it is also well known to OEMs as the producer of highly sophisticated CP/M-based utilities and operating system modifications.

Systran is a spinoff from a product produced inhouse at CompuView to read and write files to and from just about any CP/M disk format.

The first version of *Systran* available for general use is CP/M-86-oriented. However, CompuView is readying a PC-DOS-oriented version for distribution.

It's important to understand the orientation of *Systran* to really get a handle on what it does. Most PCers use and seem to like PC-DOS, which is really a machine-specific version of MicroSoft's MS-DOS. In fact, a large percentage of PC users have never used CP/M-86, or any other version of CP/M for that matter.

However, there are tens of thousands, if not hundreds of thousands, of PC users who were raised on CP/M and look at PC-DOS as sort of a user-friendly version of the venerable Digital Research operating system. Many assembly language programmers like DR's way of doing things and prefer to do their original work with CP/M-86. In some multi-machine offices, it's not unusual to find side-by-side PCs, one using PC-DOS and the other using CP/M-86, and a third machine from another vendor running concurrent CP/M-86 down the hall.

Obviously, when MS-DOS, PC-DOS, CP/M-86, and possibly concurrent CP/M-86 are all running under the same roof, there are times when files have to be swapped among various operating systems and formats. That is the function of *Systran*.

Users of both CP/M and PC-DOS are familiar with the concept of transient, as opposed to internal, commands—operating system utilities that exist in their own *.COM (PC-DOS) or *.CMD (CP/M-86) files. CHKDSK.COM is such a transient utility or command in PC-DOS; PIP.CMD is an example of a transient utility in CP/M-86. DIR is an internal command in both systems.

(continued)

Access Matrix SS
Associate
Avatar TC10 40 TPI
Crommco CDOS SS
Cromemco CDOS DS
DEC VT18x
DEC Rainbow 100
Epson QX10 CP/M (early)
Epson QX10 Valdocs, CP/M
Epson QX10 CP/M (European)
Groupiel III CP/M
HP-125 CP/M
HP-86A CP/M
IBMPC CP/M-86 SS
IBMPC CP/M-86 DS
KAYPRO II
LNW CP/M 40 tk SSDD
Lobo CP/M
MS-DOS (all PC workalikes)
Micral 9050 CP/M
Morrow Designs SS
Morrow Designs DS
NEC PC8001a SSDD CP/M
NEC PC8801a DSDD CP/M
Osborne DD
Otrona Attache
p-SYSTEM SS & DS
PMC Micromate DSDD 40 tk
Quark
Reynolds & Reynolds TC1000
Sanyo MBC-1000
Sharp YX-3200 CP/M
Superbrain Jr.
TI Professional CP/M SS
Televideo TS802
TRS-80 Mod III FEC CP/M
FEC T80S
Hurricane Labs
Memory Merchant
TRS-80 Mod III TRSDOS 1.3
TRSDOS (Color Computer)
Turbodos (Digilog, Televideo)
Xerox II 820 SSDD
Zenith Z90 w/Z37 CP/M
Zenith Z100
Zenith w/Magnolia CP/M
Zorba SS

Figure 1: *All of these formats are readable by* Xeno-Copy.

The CP/M-86 version of *Systran* is a series of transient utilities (commands) that run under CP/M-86: MSBOOT, MSDIR, MSDUMP, MSERA, MSINIT, MSREAD, MSTYPE, and MSWRITE. Like other CP/M transient utilities, these files can be resident on any CP/M-86 disk in any combination. The only requirement is that they be available somehow to the operating system. Each of the commands takes a "tail" or argument that is similar in syntax to the CP/M-86 commands that perform similar functions.

Moving Files

An example may make things clearer. Suppose you have booted CP/M-86 and decide you have a file on PC-DOS disk that you want to move to a CP/M-86 disk. Assuming that the CP/M-86 disk is in drive A and has the appropriate *Systran* utilities on it, the transfer is accomplished this way:

First, the PC-DOS diskette is mounted in drive B. You should check the directory to be sure the file you need is there. The command to do that is

```
A>MSDIR B:.
```

The drive spec could standalone or be used in any of the syntaxes allowed under CP/M's DIR command.

To copy the file—TEXT.TXT in this example—you invoke the MSREAD command like this:

```
A>MSREAD A: = B:TEXT.TXT.
```

The file TEXT.TXT will be copied from the PC-DOS disk in drive B to the CP/M-86 disk in drive A. CP/M users will recognize that the MSREAD command tail is in PIP format.

To reverse the direction—that is, to copy the file SAMPLE.TXT from the CP/M-86 disk to the MS-DOS disk—the user invokes the command

```
A>MSWRITE B:=A:SAMPLE.TXT.
```

MSTYPE, MSDIR, and MSERA perform the same functions to files on a PC-DOS disk that the CP/M commands TYPE, DIR, and ERA would accomplish on a CP/M-86 formatted diskette: TYPE the file, display the DIRectory, and ERAse the file.

The commands MSINIT and MSBOOT are a bit more complicated. As their names imply, the MSINIT command initializes a diskette in an MS-DOS format and MSBOOT enables the user to load the MS-DOS system into memory for execution.

Formatting Differences

When a format utility is used in CP/M, it simply writes tracks and sectors on the blank diskette. However, when a format utility is used in MS-DOS, it not only writes track and sector boundaries, it also organizes the disk sectors into regions. MS-DOS also enables the user to select various sizes for each of the regions. At the same time, sectors can be placed in various arrangements on a disk. These arrangements are called formats. *Systran* supports the five formats shown in Figure 2 and a single organization per format shown in Figure 3.

To create an MS-DOS readable disk, you first format a disk into one of the five allowed *Systran* formats using a standard CP/M utility. Then the MSINIT command is used to initiate the organization appropriate to the format chosen. Once the diskette is formatted and initialized for MS-DOS, the MSWRITE command can be used to transfer text or binary files from CP/M-86 diskettes to MS-DOS formatted diskettes.

The generic MS-DOS system has two hidden system files, MDDOS.SYS and IO.SYS, which are purchased with MS-DOS and are roughly comparable to IBM-DOS.COM and IBMBIO.COM. These system files can be seen by MSDIR and copied to the CP/M system diskette with MSWRITE. When the command MSBOOT is invoked, MS-DOS is loaded

(continued)

Number	Type
1	8-inch single-density, single-sided, 128 bytes per sector.
2	8-inch double-density, single-sided, 1024 bytes per sector.
3	8-inch double-density, double-sided, 1024 bytes per sector.
4	5¼-inch double-density, single-sided, 512 bytes per sector, 8 sectors per track.
5	5¼-inch double-density, double-sided, 512 bytes per sector, 8 sectors per track.

Figure 2: *These MS-DOS disk formats are all supported by* Systran.

Parameter	For Format Number (referring to Figure 2)				
	1	2	3	4	5
Sectors per allocation unit	4	1	1	1	2
Number of reserved sectors	1	8	1	1	1
Number of sectors in FAT	6	1	2	2	2
Number of FATS	2	2	2	2	2
Number of directory sectors	17	4	6	4	7
FAT identification byte	FEh	FEh	FEh	FEh	FFh

Figure 3: *MS-DOS organization parameters supported by* Systran.

just as though an MS-DOS disk had been inserted in drive A for a normal boot.

An MS-DOS-oriented version of *Systran* is under development. However, it's a good bet that the MS-DOS version of *Systran* will be a collection of MS-DOS transient commands similar to those in the CP/M-oriented version. It might include

It's a good bet that the MS-DOS version of *Systran* will be a collection of MS-DOS transient commands.

files called CPDIR, CPREAD, and the like, which would use tails with MS-DOS syntax.

As an experiment, I transferred binary and text files to single- and double-sided diskettes formatted on two machines running under both the IBM and DR releases of CP/M-86. The source files were on single and double sided PC-DOS disks formatted under DOS 1.1 and 2.0 (eight-track option). I also formatted and initialized several disks with the CP/M utilities and MSINIT. These diskettes operated flawlessly under PC-DOS versions 1.1 and 2.0.

Truth in Advertising

Each of the *Systran* commands worked as advertised. The documentation that I saw was in draft stages but was nevertheless clearly written and easy to understand.

The true utility of this operating system seems to be in its transient command format. MS-DOS diskettes can be moved in and out of the disk drives (and their files can be manipulated) in the CP/M-86 environment without rebooting or loading a standalone transfer program. This is an additional advantage for those CP/M loyalists who do not want to learn any of the MS-DOS command structure. ■

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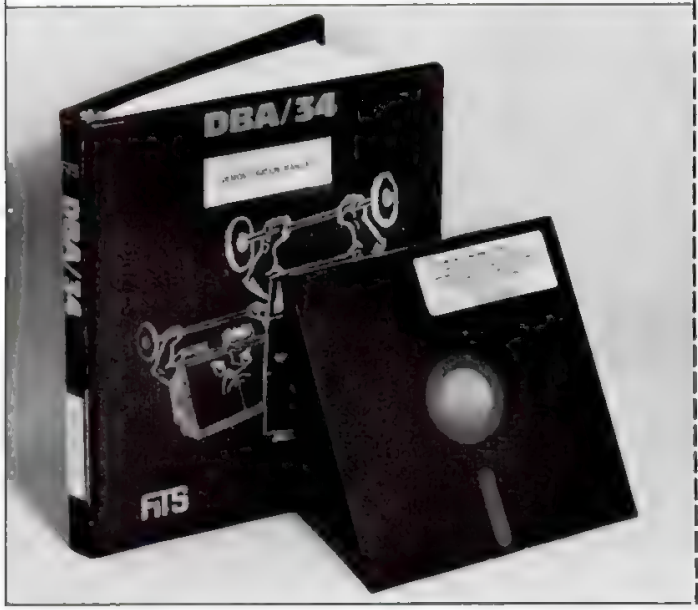

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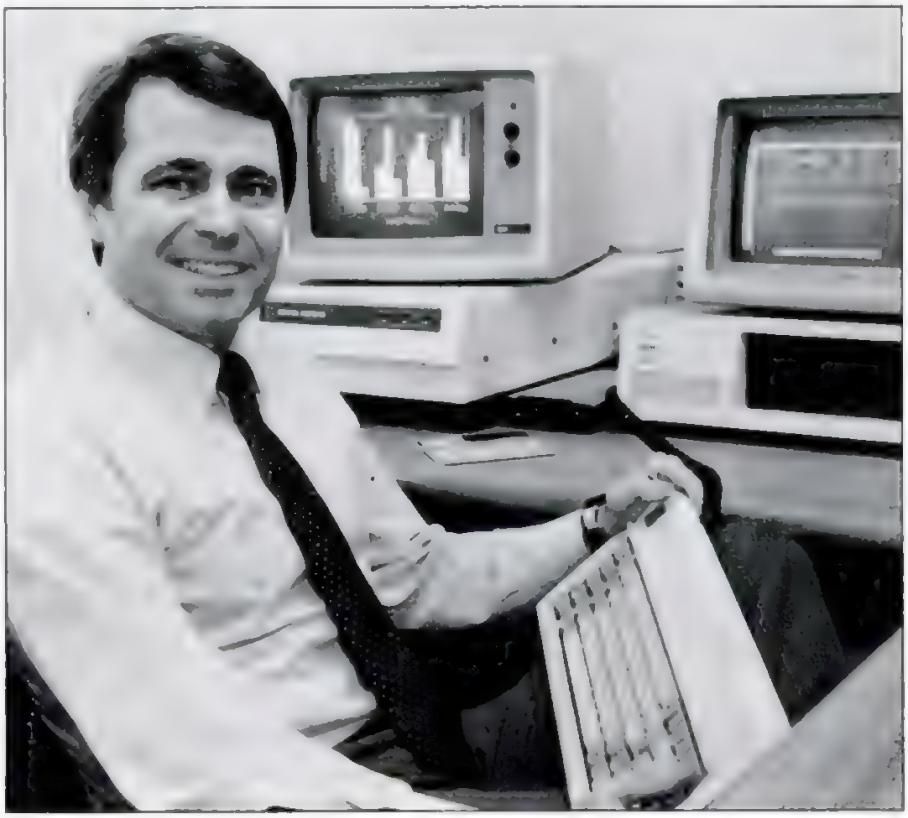
CIRCLE 195 ON READER SERVICE CARD

PC Comes To The Newsroom

A PC supplies WABC-TV's camera crew with the data needed to beam the TV signal back to the transmitter. Back at the station, the PC is used for a myriad of other applications.



Michael Hudak, director of research for ABC-TV owned and operated stations, with a PC configuration in his New York office.

Photograph: Steve Fenn

The explosion shattered windows and woke residents for miles around. The resulting flames lit up the sky, the choking black smoke roiling in the wind of the fire storm. It was January 8, 1983, and the Texaco tank farm in Newark, New Jersey was ablaze in the night.

News media personnel headed toward the disaster as quickly as the firefighters and rescue workers. The reporters and cameramen of New York's WABC-TV arrived about 12:30 a.m., set up their equipment, established their signal in 3 minutes, and sent the pictures and commentary back to the studio in midtown Manhattan. The takes were recorded on videotape, the technicians and editors working in concert to create a coherent story.

By 2:30 a.m. the nightshift workers and insomniacs watching Channel 7's latenight movie were startled with scenes of the terror threatening the Newark area; the blaze could be seen for miles around. The TV network was feeding the story to the West Coast during the eleven o'clock

news. Had the fire not been contained, ABC reported, the scope of damage would have rivaled that of the 1947 Texas City disaster. By the time New Yorkers—separated from the inferno by a strip of brinish water called the Hudson River—awoke, the news of the Texaco disaster was already several hours old.

The other New York, New Jersey, and Pennsylvania mobile video crews had gotten the story, too, but Channel 7 had been first to air it—a cause for celebration in any TV newsroom. The reason? ABC had an edge on other TV stations; it was using an IBM PC with a database that supplied the camera crew with the information needed to beam the TV signal back to the transmitter.

Microwave Transmission

The sending and receiving of picture signals requires complex synchronization. The transmitting and receiving antennas must be in each other's line of sight. This is difficult in most areas of the country, but

By 2:30 a.m., nightshift workers and insomniacs watching Channel 7's latenight movie were startled with scenes of terror.

in the New York metropolitan area, where the tall buildings interfere by acting like antennas, it's next to impossible.

New York City's sparkling towers may create a glittering, imposing impressive skyline, but they wreak havoc with radio-frequency signals, making it impossible to beam signals directly to the WABC-TV antenna on top of the Empire State Building in midtown Manhattan.

It wasn't until 1979, when microwave antennas were installed for signal transmission/reception, that live coverage became possible in the congested Northeast. Prior to that time, all news events were recorded and then rushed back to the station for processing before airing. In these early days, recording was on film. Then came videotape, which at least eliminated the photo-processing step. Even so, news was not getting on the air while it was still in the making—a claim that only radio could make. Now, with microwave antennas installed, this claim could also be made by TV stations, too.

Basically microwave transmission works on the same principle as optical reflection. To send a signal from point A to point B, it is required (in the New York area) to send it to point C first, and possibly even to point D before it can reach point B, the receiving antenna. Channel 7's two microwave relays are on Long Island and in New Jersey.

The concept is roughly analogous to shooting pool—the signal may carom off a building 100 miles away from its origin, hit the microwave disk in New Jersey, bounce over to the relay on Long Island, and then be received by the antenna in Manhattan. Within the 13-mile long island of Manhattan itself, the signal may bounce back and forth among half a dozen buildings before it is received by WABC-TV's antenna. The secret to microwave transmission lies in properly calibrating the transmitting antenna at the point of origin. The azimuth and range must be calculated and tested on a trial-and-error basis, a time-consuming process.

To effectively utilize the beam-bouncing technique, a news department must precisely determine where to set up its remote camera equipment so that the transmitting antenna on the truck will relay the signal to the proper "bounce" points, and the signal will be received by the station's antenna. The TV crew that most quickly determines the precise location from which to transmit is the crew that gets the news on the air first.

Shortly after microwave transmission came into being, Michael Kaye, an engineer for Channel 7, had an idea: A personal computer could help tackle the problem of immediate coverage of live news events. A PC with custom-designed software would store a database with exhaustive information on every location assignment. The program would allow for easy entry and fast retrieval of data.

Detailed information pertaining to location assignments exists in all TV newsrooms. Filing this information not only is required by the FCC, but is essential for legal, historical, and research purposes. Channel 7's log contained the information, all right, but in a form that made quick retrieval impossible.

New York City's sparkling towers may create an impressive skyline, but they wreak havoc with radio-frequency signals.

Using specially designed software, the data (which previously had been collected on-site by engineers) could be entered into the PC. This system allowed for instant access. An operator back at the station could call up the information, and cameramen could be provided with a printout for a particular location.

The ability to gain access to information from a database is particularly effective in covering scheduled events, such as the Brooklyn Bridge Centennial. Position coordinates pertaining to the event can be logged into the computer in minute detail. The engineers can go out beforehand to size up areas not already on file. Then, on the day of the event, the crews can roll directly to the right positions without having to spend additional time checking out their relay points. Since all a television station has to sell is time, to management, every minute saved is a dollar—or hundreds of dollars—earned.

Other PC TV Applications

WABC-TV recognized somewhere along the line that it was not immune to a syndrome that might be called "microcomputer creep." As with other corporations, more and more creative employees acquired their own micros, took their work problems home to solve, and brought the results back to the office.

Michael Hudak was a research director for WABC-TV when he acquired an Apple II Plus. His job was to supply the station's time sales personnel with information on ratings.

Hudak transformed the overnight ratings into charts and graphs each morning and had them in the hands of the reps by lunchtime.

Having once worked as a time and space buyer for a Los Angeles ad agency, he was familiar with the sheets of paper filled with figures intended to prove that one station had more listeners/viewers than another. In another job, he had sold time for a radio station and carried around these pieces of paper himself. In neither position was he comfortable with the reports from the ratings services. The raw data was dull and not all that informative. Hudak had an idea.

Using *Apple Plot* software, Hudak transformed the overnight ratings into charts and graphs each morning and had them in the hands of the reps by lunchtime, ready for them to call on ad agencies in the afternoon. The computer graphics printouts told a better story than the lists of numbers did. The reports resulted in more sales for Channel 7.

Then he discovered a board to add to his computer that enabled him to record computer graphics on videotape.

"It opened up a whole new world of possibilities," Hudak said. "With my equipment and an inexpensive videocassette recorder, we could sell TV with TV—as it were—and it was an impressive story to tell the time buyers."

The graphs—line, bar, and pie charts—could be generated in color and recorded onto the videotape. Voiceover and music could be added for emphasis. The time slots being presented could be illustrated with segments of the TV programs under discussion. When you combine a computer with your imagination, the possibilities are endless.

Hudak's impressive success in upgrading the sales presentations with videotaped computer graphics won him a promotion. He is currently director of research for the far-flung ABC-TV O&O (owned and operated) stations, which include WABC-TV, New York; WLS-TV, Chicago; WXYZ-TV, Detroit; KGO-TV, San Francisco; and KABC-TV, Los Angeles. Every day his department receives the overnight ratings, which are downloaded from his PC via micros from the O&O markets, and prepares the sales material for each of these markets as well as for ABC-TV spot sales, which sells ABC station time in other markets.

About a year and a half ago, management realized that "microcomputer creep" had taken over in many areas. A number of different microcomputers were being used, and the need to standardize became apparent. Software wasn't interchangeable among the different brands of microcomputers. It was also discovered that the MIS (management-information system) department was unable to keep up with the requests for timely data. A consulting firm was hired, a survey conducted, and the decision made to supply micros where needed. The system selected was the IBM PC in various configurations. Hudak was appointed to coordinate the survey and the installation. Currently, PC is serving many different functions at WABC-TV, in both the home office and all five O&O stations. Hudak spends his spare time testing new PC products as they keep appearing in the marketplace.

The MIS department is assisting department managers to achieve desired results from the PCs in both standalone and network applications. Mirril M. McMullen, MIS' systems analyst, has designed customized programs for the PC for a number of applications including:

- Recording the contractual data of all on-the-air talent (both news and live programming), to provide a timely tickler file;
- Establishing a news bank, categorized by subject, personalities interviewed, and other information; establishing a quick-reference "morgue;"
- Developing a weekly tape package of ongoing features and news analyses to sell to stations not part of the ABC network.

Currently, the PC is serving many functions at WABC-TV. Ideas for applications are coming so fast, it is difficult to keep up with them.

"The ideas for PC applications are coming so fast, it is difficult to keep up with them," Hudak laughed.

Meanwhile, back in the newsroom, the news director is yelling, "Some dumb trucker has dumped a load of lettuce all over the Long Island Expressway . . ." Kaye has retrieved the data for the location from his PC database while the news director is still waving his arms, and the camera crew is rolling. Viewers will be treated to the sight of expensive produce spoiling on the highways while they go saladless watching the Channel 7 Eyewitness News. ■

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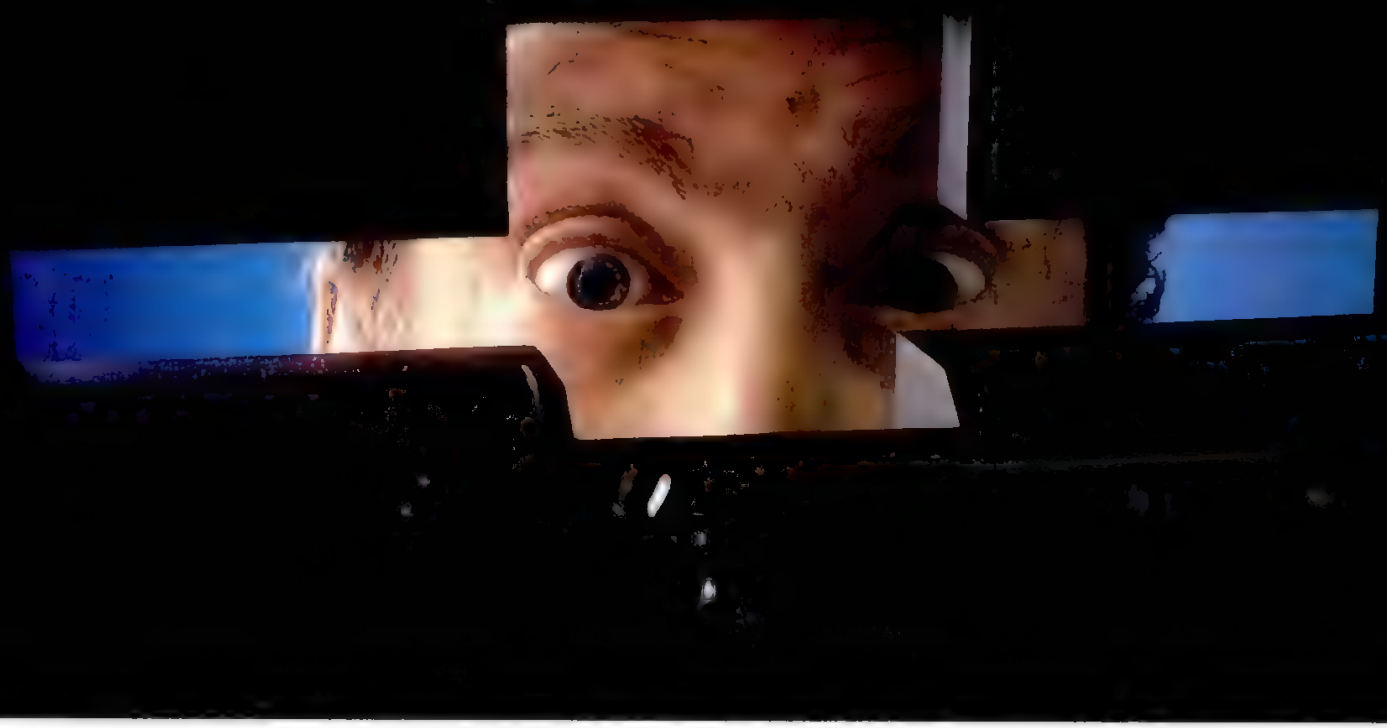

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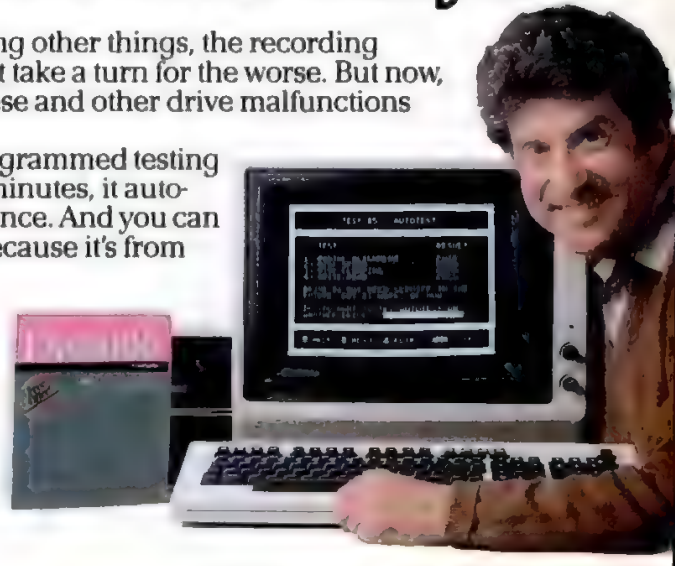

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CIRCLE 508 ON READER SERVICE CARD

Too Much *Pressure* on PCjr?

IBM's new computer for the home has elicited a good deal of negative reaction from the press. Perhaps the critics were just expecting too much.

I am stunned by the reaction of some members of the press to IBM's long-awaited announcement of the PC*jr*, the home version of the PC. Many reviewers seem to have lost objectivity about this computer. To be sure, I was quite emotional about IBM's announcement of the PC back in August 1981, but I tried to retain my objectivity and report what I saw, not what I thought. (What I thought was that I had to have one, whatever the cost!)

What's happened with the announcement of the PC*jr*, however, strikes me as odd. Many of the reviews are angry and hostile, as if IBM had somehow let us all down or not lived up to it's promises. This reaction worries me, not because IBM can't take it, but because it is important that the press report developments in the computer field as accurately and objectively as it can. You need to be able to trust what we say, or we've failed you.

So what's got my dander up? Here are a few selected examples, taken from the mass of articles I've been reading, of the kinds of reactions that PC*jr* has elicited and my own response.

"The price is too high!" Balderdash. This complaint is really sour grapes. People who say this are just plain mad because the price is higher than they wanted it to be. Of course the price is *high*, but from a marketing point of view, the price is right, even taking into consideration the premium for the label.

Students will be using the new PCjr as an educational tool in the classroom—a market that traditionally belonged to Apple.

This machine is not, after all, a VIC-20 or Timex/Sinclar 1000. It is a PC in a junior-sized box. It is fast, well-rounded, and expandable.

PC*jr* is *very* compatible with the PC. IBM has gone to some lengths to make it so. DOS versions 1.1 and 2.0 seem to run on PC*jr* even though IBM does not say so. It is "media compatible" with the PC, meaning that a lot of software for the PC will run on PC*jr*. Having a machine at home that is both execution- and media-compatible with a machine at work is attractive, especially when it also supports entertainment and educational applications.

When you buy a PC*jr*, therefore, you buy potential, which is not the case with a lot of systems, even those sold at a higher price. If you compare PC*jr* with other

machines of similar performance, capacity, and potential, it is priced fairly.

If you don't like the price, don't buy one. But don't get mad.

*"IBM stole all the ideas embodied in PC*jr *from Apple!"* To say "stole" is a little strong, but I agree with the sentiment. The Apple II sets a very aggressive example. But that's no reason to get angry. In fact, shouldn't we congratulate IBM for being humble enough to imitate a winner and for not having a chip (no pun intended) on its corporate shoulder?

In the past, other vendors have benefited from the PC's popularity, in large part because IBM decided to make the machine an open system. That decision led a flood of third-party vendors to make

If you don't like the price, don't buy one. But don't get mad.

their machines and software compatible, giving the PC a broad base of support. Maybe if Texas Instruments had learned this lesson about the value of following the leader, it would still be in the small computer business. I'm glad IBM learned it: it makes the value of my system considerably greater.

"The keyboard stinks!" Here's one complaint with which I heartily agree. I do think IBM made a serious mistake by not equipping the PC*jr* with a full-stroke keyboard, instead of a hybrid with depressible keys but membrane action. It does not have a numeric keypad or function keys, but these losses do not worry me as much because their functions are still available through the PC*jr* keyboard. However, it seems clear that the home market demands a certain minimum acceptable configuration, and a full-stroke keyboard is definitely a big part of that configuration. IBM blundered badly in producing a less-than-perfect keyboard just as public acceptance of these lesser keyboards has begun to erode.

But again, I'm not mad about it. I simply won't buy one, or if for some reason I am compelled to do so (an 8-year-old son is a reason), I will replace the keyboard with a better one from the independent sources that will surely emerge.

The keyboard for new PCjr is prompting more attention than any other part of the system. It does not have a numeric keypad or function keys.

*"IBM has positioned PC*jr *so that sales of the PC will not be affected, and thus it has arbitrarily inflated the price."* Good for IBM. Put yourself in its shoes, or in any company's shoes that has a new product in the same family as its last one.

PC*jr* is not a steppingstone. It is clearly a system unto itself, with a potentially long life-cycle. If you buy one you shouldn't need to discard it a year later in favor of something else.

Actually, I'm sure IBM is concerned about erosion of the PC product line. I'm equally sure that any such erosion would be very short term, since it would be easy to enhance the PC to make it more attractive than PC*jr* and since IBM is bound to bring out a new PC (call it PC II) in the near future.

If anything is really going to erode sales of the PC, it will probably be its lack of availability. It's been hard to get PCs quickly, and the word from retailers concerning availability of PC*jr* isn't encouraging.

*"PC*jr *is not technologically advanced."* That's for sure. That drawback does not mean PC*jr* is not a useful or powerful computer. I happen to think it has the right amount of power for the home market. PC*jr* is powerful enough. I won't quibble: the 8088 is an 8-bit processor, however it is fast, capable, and supports a good deal of main memory. It is also well-supported with ancillary chips. Think about what PC*jr* can do, not about what it can't. We all wish for better graphics, and it is true that some other machines do some tricks better, but PC*jr* is rather well-balanced.

"IBM is a corporate giant. Apple is our friend. I want to buy from a friendly company." No comment. I don't get involved with anyone's religious beliefs.

"The Univeral/Galactic micro from Milky Way Systems will wipe the IBM micros out of existence next week because IBM has been too cautious." Something better is always just around the corner. Even PC*jr* is still around the corner. I understand the thought. However, knocking off Big Blue in any market it serves would be quite an impressive accomplishment.

I take this matter *very* seriously. After all, I'm a member of the press with, shall we say, an abiding interest in IBM products. If somebody is going to knock off IBM, I'd like to know. Soon. ■

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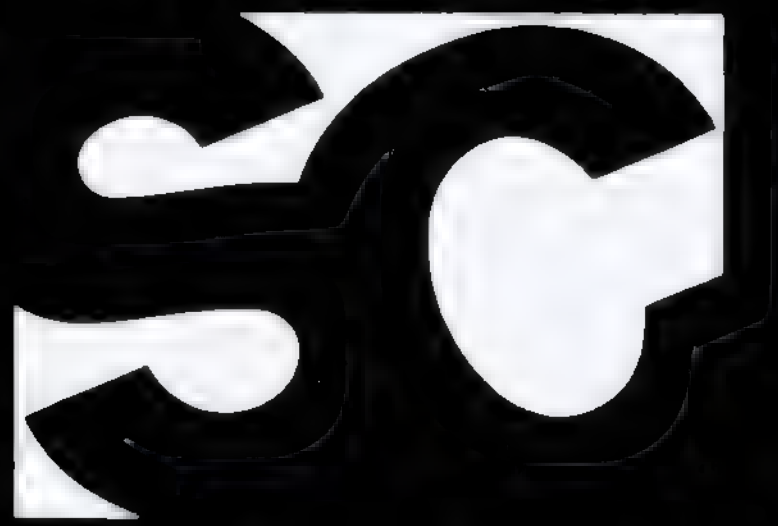

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CIRCLE 144 ON READER SERVICE CARD

Major and Minor Fun

The Insecticide and Tick Attack are real bombs—and we don't mean bug bombs. But you'll have double fun with Master Miner, where two can play simultaneously.

Every time I'm ready to declare a complete moratorium on reviewing shoot-'em-ups in space, someone comes along with something out of the ordinary in this otherwise predictable genre.

Master Miner by Funtastic is a well executed, predictable alien-blaster, but with one significant difference: It can be played by two persons simultaneously. You can work together against the computer, or you can consider the computer and your coplayer both enemy craft. The game takes on a completely different feeling when played in this way.

"The object of *Master Miner* is to maneuver your ship to mine the gems which pop up in the asteroid belt. You then must return them to your starbase. You gain 150 points for every gem you deposit in your starbase.

If you've got two joysticks—a nonstandard configuration for an IBM PC, but one that is supported by the game adapter board—you can play with a friend, one against the other, using the sticks and buttons for maneuvering and firing. Alternatively, both players can work the keyboard at the same time using the preassigned combinations of keys on the left and right side, or they can redefine the keyboard commands to their own liking. It is also possible to have one player using a joystick and the other the keyboard. A solitaire game can be set up either way.

The screen is a busy wonder—full of asteroids, "zizzing and snagging" alien ships (Gem protectors, Seek and Destroyers, Kamikazes, and Gem Thieves), and clumps of gems that pop up from time to time in different corners (see Figure 1). Each player has a safe zone where the gems are to be deposited; no enemy torpedos can penetrate the walls once you are inside. You have a limited number of torpedos each time you venture out of your safe haven; the supply is replenished while you catch your breath.

Master Miner
Funtastic, Inc.
724 Meadowlark Rd.
Audubon, PA 19403
(215) 666-0337
List Price: 39.95
Requires: 64K RAM, color/graphics adapter. Game adapter and joystick optional.

CIRCLE 724 ON READER SERVICE CARD

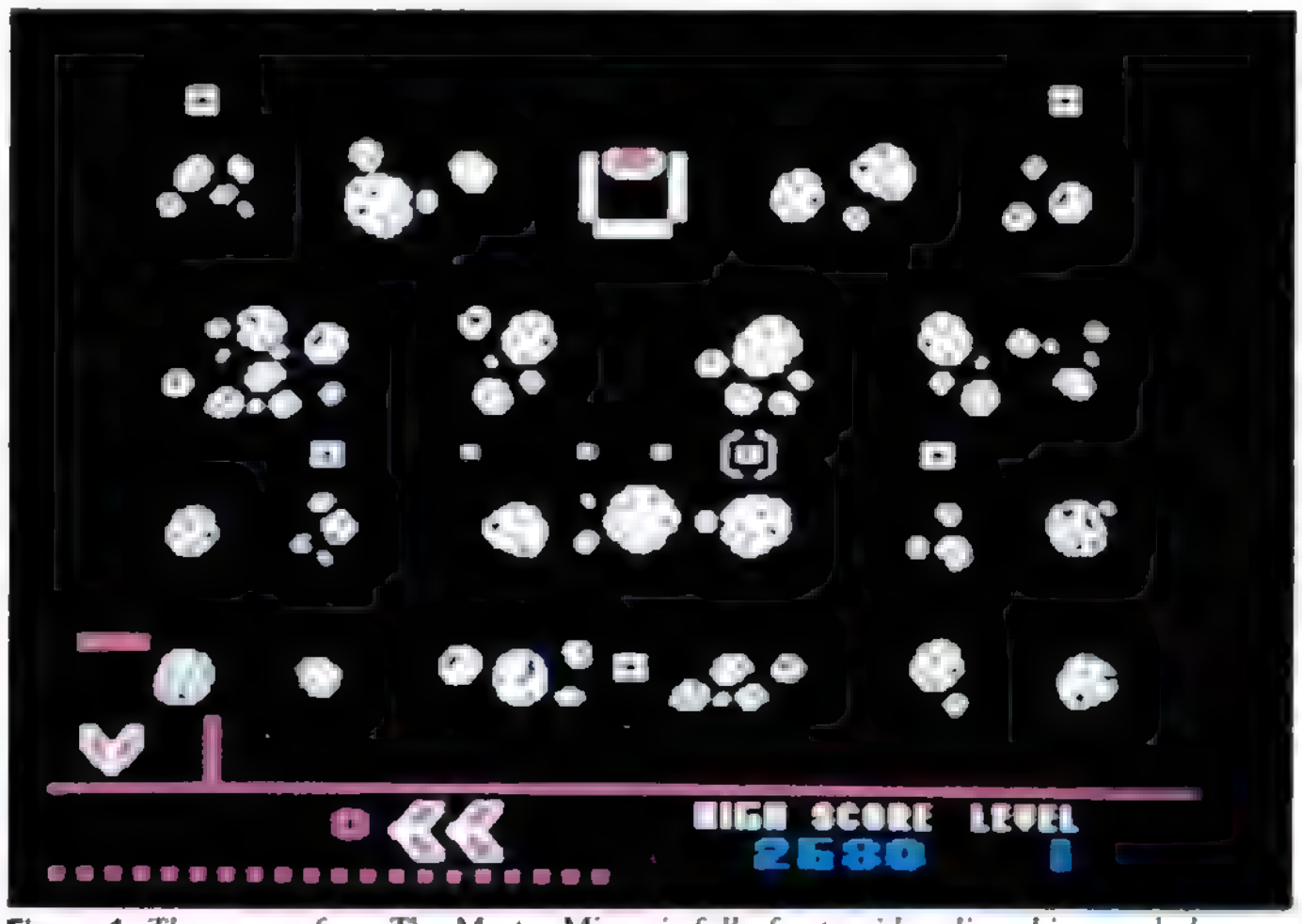

Figure 1: *The screen from* The Master Miner *is full of asteroids, alien ships, and clumps of gems.*

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PC ARCADE

There are five user-selectable levels of play, each slightly more frantic than the one before. The game seems adequately protected against crashes, and the sound can be toggled on or off. The Escape key can be used to pause the game. High scores are maintained on disk, and the disk is copy-protected.

Colors on an RGB monitor were all from the purple, red, and blue palette of IBM's medium-resolution mode. The game was easy to play on a monochrome monitor hooked into the color/graphics board.

The two-handed version is a walk on the wild side, and a saving grace that kept *Master Miner* from the growing pile of "kill-the-aliens" games on my back shelf.

On *PC*'s scale from one to six, *Master Miner* rates:

FUN:	3.5
CHALLENGE:	4
COLOR/GRAPHICS:	4
TOTAL:	11.5

The Insecticide
Bel-Air Software
Cortland Data Systems
P.O. Box 14414
Chicago, IL 60614
(312) 549-2029
List Pice: $34.95
Requires: 64K RAM, color/graphics or monochrome display adapters and monitors.

CIRCLE 723 ON READER SERVICE CARD

To heck with *The Insecticide*. Send for the deodorant.

The premise: "The armies of Bugdom are on the march, and they are headed for your house. Can you stop them? You are THE EXTERMINATOR and it's up to you. PROTECT AT ALL COSTS! . . . When you shoot a 'creepy crawly bug,' it leaves the tail end as a skeleton. If a bug hits a red skeleton it will plunge straight down and into your house unless you shoot quickly. You also lose twice as many points for a bug that gets into your house than you score for shooting it."

I'll save you money, while I save myself time. Here are the low points:

The minimal instructions, both the printed card and on-screen versions, offer little help. The graphics display is minor-league (see Figure 2), using only ASCII characters, even on the color/graphics version; the sound effects are obnoxious

Figure 2: *The armies of Bugdom are on the march in* The Insecticide.

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CIRCLE 356 ON READER SERVICE CARD

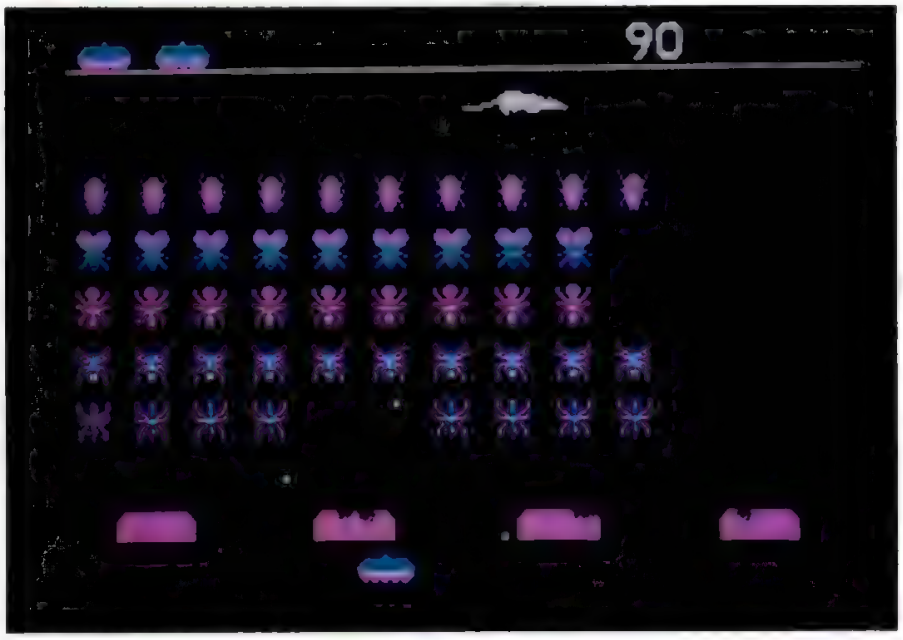

Figure 3: The Tick Attack *is a born-again* Space Invaders.

enough to send any neighborhood dog into permanent hiding; and the game action from the keyboard is S-L-O-W. Other than that, it's just fine.

My suggestion: Save you money for fly paper. It's more entertaining.

On *PC*'s rating scale, from one to six, *The Insecticide* is a butterfly's sneeze and sets a new standard for net worth:

FUN:	0
CHALLENGE:	0
COLOR/GRAPHICS:	0
TOTAL:	0

Tick Attack
Pegasus Software
8525 N. Lamar, Suite 254
Austin, TX 78753
(512) 441–6452
List Price: $19.95

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PC ARCADE

Requires: Color/graphics adapter. Game adapter and joystick are optional.

CIRCLE 722 ON READER SERVICE CARD

Bugs again. I can just imagine the probable conference room (rec room?) conversation that led to this unimpressive venture:

"What this country needs is yet another *Space Invaders*."

"But, boss, that's already on the market, and any computer owner who wants *Space Invaders* probably already has the game."

"No problem, moron. We'll call it something different and give the buyer absolutely no hint of what he's getting."

And thus was *Tick Attack* probably conceived—as a born-again *Space Invaders* with descending ranks of bugs and a rat skittering across the top of the screen instead of a space ship (see Figure 3). You've got a tank, and you've got bunkers behind which to hide, and you've got a laser gun. Yawn.

The game is packaged with a color page full of hideous bugs on the front and the hardware requirements on the back. If you read the game description, you *might* get the idea that this is a buggy version of *Space Invaders*, but you're more likely to think it is something very different.

If you're looking for *Space Invaders*, you might consider this version, or you might consider a version that makes no effort to disguise its true nature and that even offers a few enhancements. *Space Strike* or *Cosmic Crusader* will do you quite nicely and will keep the bugs out of your hair (and pocket).

On *PC*'s scale from one to six, *Tick Attack* slithers its way to a mediocre score:

FUN:	3
CHALLENGE:	3
COLOR/GRAPHICS:	3
TOTAL:	9

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Buying A Business Computer

Consultants offer procedures to follow and pitfalls to avoid in buying your company's first computer. Here's how to get what you need and what you pay for.

You're contemplating buying a computer for your company, and you're a bit intimidated by the prospect. You have so many factors to consider: hardware, software, reliability, service, contract terms, programming expertise, power supply, to name just a few. It's your first business computer purchase, so you want to make sure you cover all the angles before you buy. You don't want to get burned. You need some advice from an expert. If you can't, or won't, hire a consultant, the next best thing is to read a book written by one. It will spell out the buying process for you.

Two consultants have recently published works that can help both the first-time business computer buyer and the one who got burned the last time and is trying again.

As the title indicates, *Computers for Small Business* caters to a specific type of operation. Although brief, the book is easy to read and can be of value to the beginner. The set of worksheets and checklists that take you through the entire decision process are particularly useful.

Computers for Small Business: A Step-By-Step Guide on How to Buy
Gary Bencar
(La Cumbre Publishing Co., Santa Barbara, CA, 1983)
132 pages, plus worksheets; $9.95

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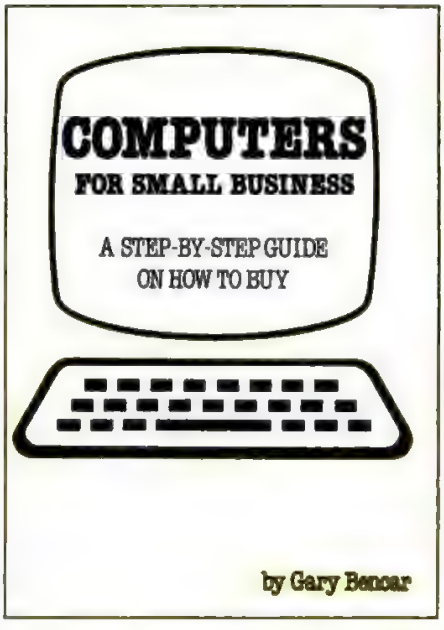

The author, Gary Bencar, begins by discussing the numerous uses and benefits of microcomputers in business and then discusses the revolutionary effects they have had upon the way standard office procedures are carried out. Microcomputers are used for office applications, including automated banking, telemarketing (getting sales leads by phone), and generating assignments and schedules. Some additional benefits are "what-if" analysis, computer-assisted-design, and computer-assisted-instruction.

He then briefly covers some of the hardware devices and information services available to expand your computer's capabilities in the office.

After this introduction, Bencar gets down to business. He recommends that your first step be a "needs analysis" of your company. He believes this study should include such areas as accounting, production, marketing, personnel administration, inventory, education, records storage, and vehicle maintenance schedules. It should define exactly what the

(continued)

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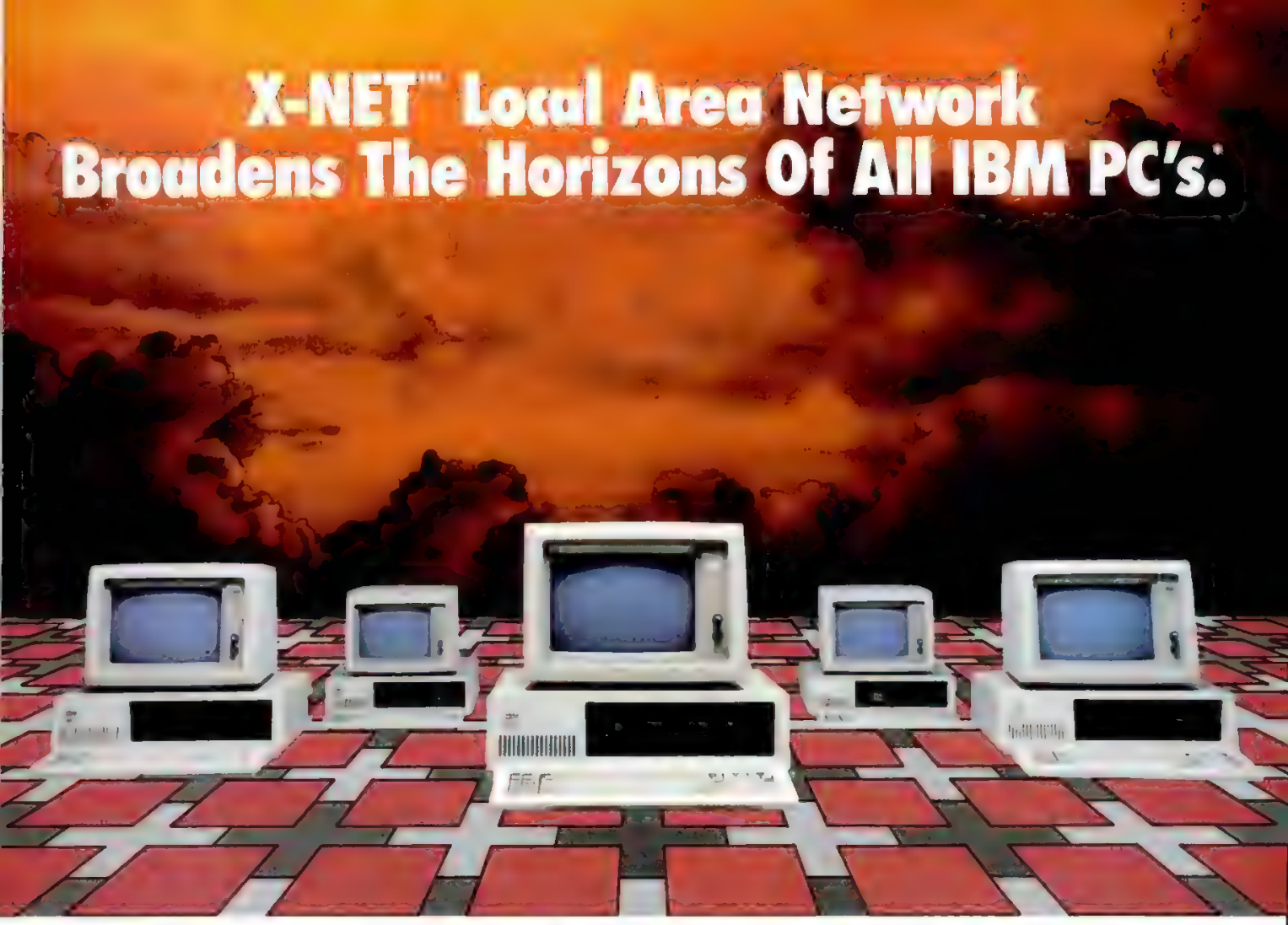

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BOOK REVIEW

computer should do for each operation.

Once you have completed the study, you can now decide which parts of your business to computerize. Remember to consider whether you are likely to expand your computer use in the future. The next step is selecting software. Although off-the-shelf, ready-to-use packages are relatively inexpensive and immediately useful, Bencar points out that they might not meet your needs exactly. Another option is custom-written software, but this is expensive and getting it to run smoothly may take time.

The middle ground solution might be to buy ready-to-use software and hire someone to customize it. However, this option is also costly and time consuming. Furthermore, customization may not be possible if the manufacturer has not made the original program code available. Only after you pick the software can you choose the hardware. In addition to the technical points, such as whether the machine has the right operating system and enough memory to run your software, you should consider its ease-of-use. For example, the keyboard layout might be unfamiliar, and operators might require training.

Bencar's last piece of advice is to "make a commitment to the purchase." New hardware and software designs will continually emerge, so waiting for new developments may mean you never buy. However, you should make sure that your hardware and software will be adequate for your business for several years to come. Additions and updates to the hardware and software should be possible, but don't buy a system you will want to replace within a year or two.

How to Buy a Business Computer and Get It Right the First Time is less of a primer and more of a dissertation on pitfalls to avoid in buying a computer. Its author, Edward Cross, assumes you already know how to proceed. If you are familiar with computers, know your business, want a purchase contract, and feel confident you can negotiate one, this is an excellent book. Even if you don't meet these prerequisites, it would make a fine reference work. Cross advises you to learn about computers before you go shopping and warns of the temptation of low prices. He lists the specifics that you'll have to consider: memory and disk capacity, choice of monitor and printer, keyboard style, and system expansibility. Don't forget such hidden costs as printer paper and ribbons, training, and insurance (for parts failure, electrical surge damage, theft, employee vandalism, and fires).

Another consideration is maintenance contracts; what should they include? Should you take the machine in to be worked on or should the technician come to you? Which is more expensive? What about software maintenance? In payroll, for example, tax tables in the program might need to be changed, which might entail having the program customized or sending the program disk back to the manufacturer for changes. Cross also points out that fireproof file cabinets for paper are not adequate for disk storage, since the disk will be destroyed at temperatures above 125 degrees.

Training is another important consideration for this consultant. His suggestions for training sources include equipment and software vendors, community colleges, and private tutors. He also advises you to write a procedures manual for your staff. It might include sequences of equipment operation, positioning of printer controls for various printing jobs, how to load label paper, invoice paper, wide report paper, changing printer ribbons, and how to handle most common problems.

In preparing for a purchase, Cross advises you to find out how firms similar to yours are using similar software and

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How to Buy a Business Computer and Get It Right the First Time
Edward M. Cross
(Reston Publishing Company, Inc., Reston, VA, 1983)
207 pages; $14.95

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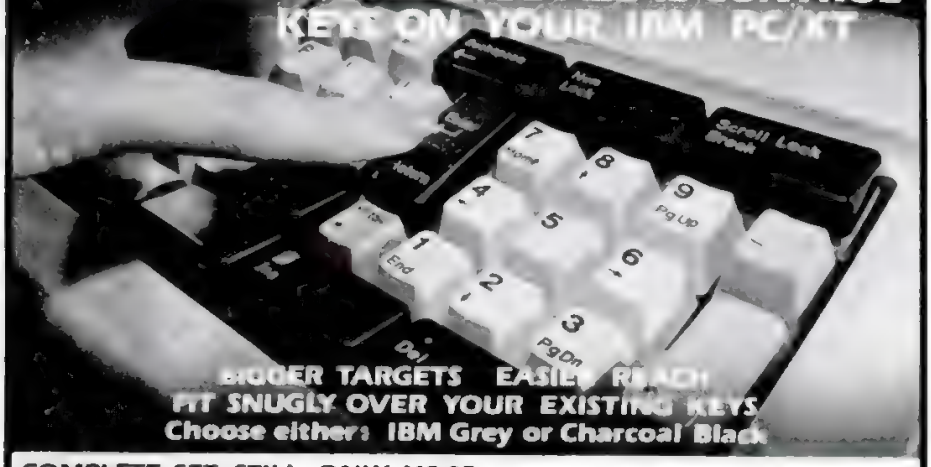

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BOOK REVIEW

hardware. Sources for this information include magazines, user groups, professional and business associations and newsletters. Like Bencar, Cross recommends that you do a thorough "needs analysis" of your business, which would specify where the computer will be used, and the volume of input in characters. He also provides checklists to use in the areas of billing, accounts receivable and payable, payroll, inventory, and general ledger. An analysis of your needs might lead to a formal invitation to bidders, a Request For Proposal (RFP).

Cross goes into considerable detail on constructing an RFP, holding bidders conferences and evaluating vendor presentations. He supplies a good sample RFP which should be useful to prospective buyers. The sample includes an outline of the required vendor response.

If you hold a bidders conference, pay close attention to vendors who show signs of genuine interest in your needs. Although most buyers are probably not knowledgeable enough to truly rate the vendors, any buyer can evaluate a company's financial condition, determine how long it has been in business, and can check references. In addition, certain comments may suggest that the vendor's products are unreliable; be alert for the signs. However, the acid test of a vendor is not its RFP response, but its contract agreements. Contract negotiation requires close attention and particular care. Cross tells you which clauses should be included in a standard vendor contract and explains the ways vendors can intimidate you using their company size, your lack of time, and your desire to purchase a certain kind of hardware or software.

Cross lays out for you the tricky procedures, concessions, and "trust" ploys vendors use, such as exaggeration and clever timing of contract negotiations. He tells you which items in the contract should not be negotiable. For example, hardware substitutions should not be permitted. If your vendor will not negotiate, then you must decide whether you can live

with his contract. If you can't, you should find another vendor.

Assuming you have signed a contract and ordered the hardware and software, you will probably have to wait for a period of at least several weeks. During this time, you should not be idle. You should be planning for conversion of files from file cabinets to disk storage, for your acceptance testing of the computer, and you should set up the computer site with specially made tables and the necessary electrical lines, or at least line filters to guard against voltage changes.

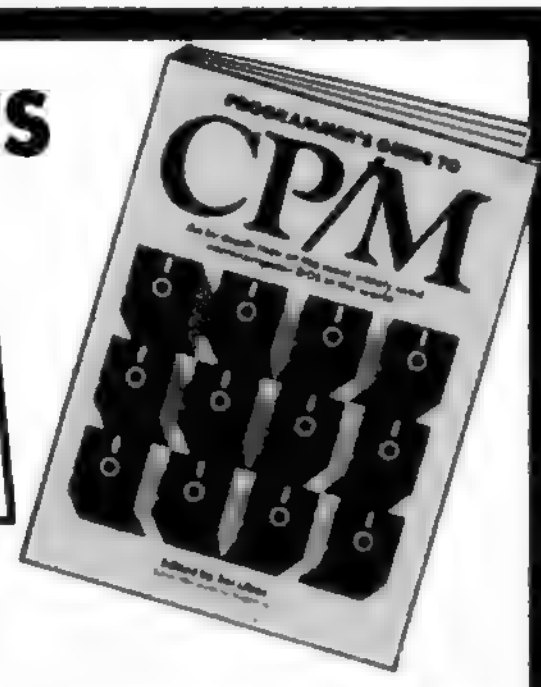
At long last, the boxes arrive. No matter how excited you are, you should not neglect careful acceptance testing, which the actual users should do. Cross also discusses various ways of paying for the equipment and software (for example, in monthly installments). He also tells you when not to pay—when items are not delivered on time, not delivered at all, or don't work as contracted, for example.

At the end of *How to Buy a Business Computer*, Cross explains nitty-gritty details of contract clauses. This section is a reference on risk-related clauses, sample specifications, performance specifications, acceptance testing, future options, maintenance, failure to deliver as agreed, repossession rights, and payment schedules. It is intended for the negotiator. He discussed the standard vendor contract in more detail. Some apparently harmless clauses could be hazardous to your financial health—for instance one that puts the contract under the laws of the state in which the vendor resides. In case of a problem, you might have to pay special travel fees to have your lawyer sue in the vendor's state.

Cross concludes with a complete "Turnkey Contract Checklist" of each line item such as the parties, a statement of work to be performed, payments, defaults, Acts of God, and software enhancements. Even for the contract section alone, this book is worth owning.

Both *Computers for Small Business* and *How to Buy a Business Computer* should be a great help to you in making the right purchase. However, *Computers for Small Business* is better suited to the computer neophyte, while *How to Buy a Business Computer* would suit the needs of the more advanced user. If you are unsure which category you fall into, well—you can always buy both. . . . ■

PROGRAMMER'S GUIDE TO CP/M



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Here's an important collection of CP/M insights that you'll never find in any CP/M manual. CP/M is the most popular microcomputer DOS in use today, and this widespread use has generated many innovative techniques and enhancements of CP/M. *Programmer's Guide to CP/M* tells you what these enhancements are and how to put them to use, how to get around apparent limitations of a CP/M system and why CP/M is far more versatile than you might have imagined. Every article in *Programmer's Guide to CP/M* originally appeared in MICROSYSTEMS between January 1980 and February 1982. Except for this collection, these articles are now unavailable! *Programmer's Guide to CP/M* gives you an in-depth look at CP/M from the viewpoint of the programmer—the individual who creates the software that interfaces directly with CP/M, or who is installing CP/M on systems for which configurations do not already exist.

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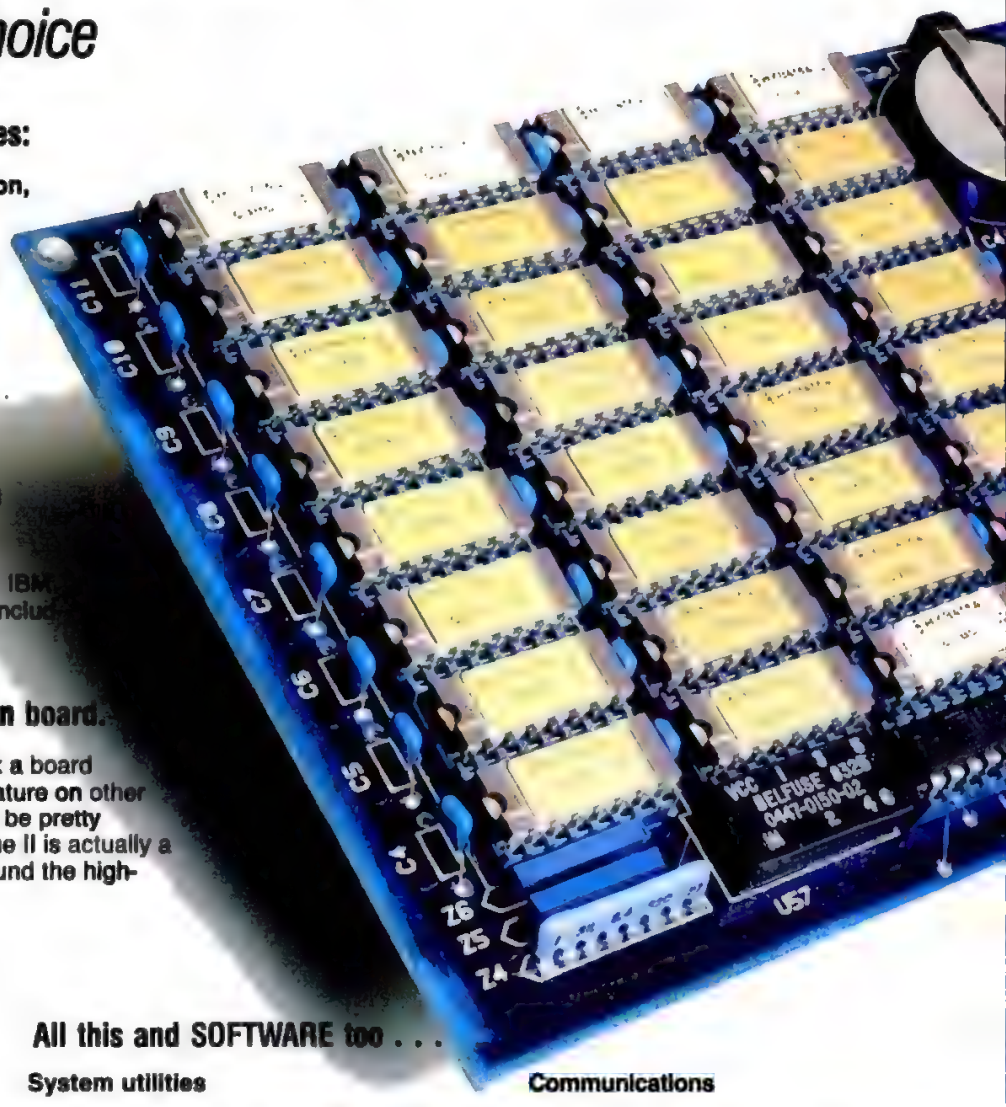

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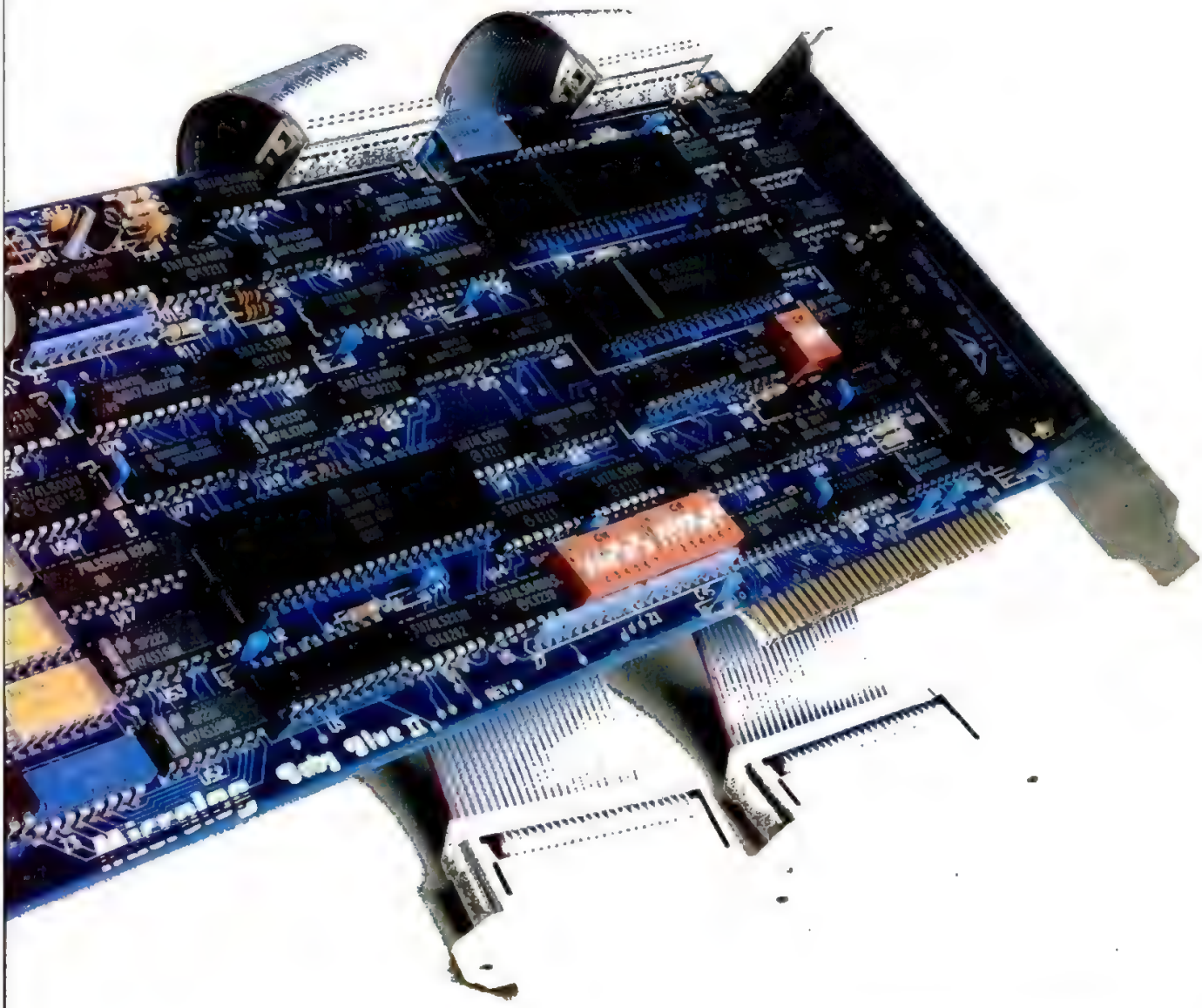

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CIRCLE 833 ON READER SERVICE CARD

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Word Processing Personalities

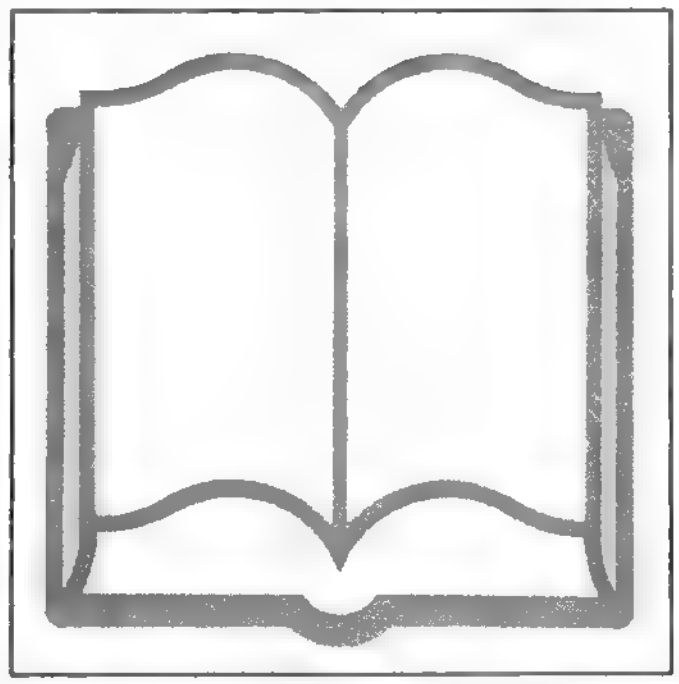
There are more ways to choose a word processing program than just quality and price. Personality counts here, too. When looking for a program look for one compatible with you.

Word processors are like people. Every program has a unique personality so if you plan to spend much time writing with your PC, pick a program as you would choose a business partner—look for one you can get along with.

If you're looking for a word processing package for your PC, first you should consider the size of your largest potential project. Many less-expensive word processing programs let you edit only as much text as you can load into memory—sometimes as little as a dozen or so pages with 64K RAM.

The popular *Volkswriter*, from Lifetree Software in Monterey, California, and *pfs:WRITE*, from Software Publishing Corporation in Mountain View, California, programs typify memory-only programs. If you want to work with large documents, these programs require you to break up your project into parts. Although you can print one part after another, you can't easily skip from one part to the other while editing.

A step up from the memory-based models are programs in which you have to explicitly ask for sections of text to be read into memory and then back out to the disk. Quite often, this type allows only forward movement through files, so you have to plan the editing of large projects in advance. *PIE:Writer*, from Hayden Software of Lowell, Massachusetts, uses this



method of text management. Although it handles files more than 65,000 lines long, only 12,000 characters are kept in memory at any one time. You can, however, write the memory onto the disk and read in the section that comes next.

More sophisticated programs use a "virtual memory" scheme, which allows you to edit the file as if it were all in memory at one time. Aside from slight delays while the program swaps material in and out from the disk, you don't have to worry about which section is where. With *WordStar*, from Micropro International, in San Rafael, California, you can move forward and backward through the entire file.

Some programs use disk buffers but still restrict you to a maximum file size well below disk capacity. *Blue*, from Symmetric, of Anaheim, California, for example, permits text files up to a maximum of only 64K.

If you intend to write only memos, letters, and perhaps a short report or two, a memory-based editor may fit your needs. These tend to be faster, cheaper, and easier to use. On the other hand, major projects require a program designed for larger files.

Step by Step

Your style of dealing with complex projects can also determine which program you should buy. Some people like to approach writing and editing step-by-step. Others like to combine commands to tell the program to perform a succession of operations before showing the result.

If you like step-by-step operation, *WordStar* is, of course, the best known in this category. Most simple editing programs such as *Volkswriter* and *PIE:Writer*, work this way, too. Although it is easier to learn and provides immediate feedback, this method requires you to repeat the entire sequence of keystrokes each time a task must be done.

The combined approach allows you to create, edit, store and execute strings of commands. Most word processors using this approach allow both immediate execution of commands and allow you to store commands for later execution. This feature has become known as "macro"

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capability. *Spellbinder*, from Lexisoft, in Davis, California, is the most well known of the PC-compatible word processors with macro capability. *PMate*, from Lifeboat Associates in New York City, is also strong in this area.

Macro capability might seem attractive just because you can issue a whole string of commands at once and then get up and stretch, or check out the next change in your text. But they really shine at processing and formatting large volumes of work according to explicit rules.

The question of step-by-step versus macro commands is a matter of how you give your instructions to the program. Whether or not the program immediately displays the results on screen or waits until printing to arrange your text as you've commanded is another question entirely. A "what you see is what you get" program attempts to show you as much as possible on screen, while other programs assume that you can either imagine the changes or wait until the printout to see them.

Pass the Formatter, Please

If you find you're willing to trade power for simplicity, another option is word processing packages that combine editor and formatter programs. With these packages, you use the editor program to enter your text and when you're finished, you run the result through the formatter, which actually carries out your commands.

This approach allows you to give complex instructions about how you want your results to look with just a few commands. You can, for example, select an outline format and the formatter will take care of all the indentation.

Perfect Writer, from Perfect Software, in Berkeley, California, and its relatives such as *The FinalWord* and *Mince*, both from Mark of the Unicorn in Cambridge, Massachusetts, are good examples of this approach. Along with a text editor, these programs include a formatter that allows you to show outlines, lists, quotations, addresses, footnotes, poems, and dozens of other formats. If you regularly work with material in standard formats, having them predefined can save you a lot of trouble. When no standard format fits, all of these programs let you use a "verbatim" format, which produces exactly what you enter with the editor.

People who are fond of their one-step editors will tell you that with an edit/format approach you don't have as much control of the output, and you can't visualize what the text will look like until you print out the result. There is some truth in this, but you'll have to make the choice. An edit/format package doesn't have the immediacy and ease of use of interpreted BASIC, but you can do some powerful things with it in a small number of program statements.

> Word processing programs make a few fingers do most of the work.

Type of Writing

The type of writing that you plan to do should also be taken into account. For short notes, memos, and letters, you don't need many fancy features. But business reports and long scholarly works demand a program that takes care of some of the bothersome but nonetheless important details.

Simpler programs will print page numbers in only one position and assume the same format for left- and right-hand pages. More sophisticated word processors allow page number placement at either the top or the bottom of the page and allow you to use a different form for left and right pages.

Similarly, if your writing needs indexes or footnotes, purchase a program that includes an easy way to create them. If you are particularly attached to a certain program but absolutely need these fea-

tures, you can buy add-on programs that create indexes and footnotes. But if you're spending a lot of time doing academic work, you'll want a program with these capabilities built in.

Finger Freedom

Word processing programs make a few fingers do most of the work—generally the smaller and weaker ones on one hand. If that's a problem for you, you might want to consider a whole different approach to hardware. Microsoft has just released a mouse-oriented word processor for the PC, *Microsoft Word*.

With the mouse, you give editing commands by moving the mouse on your desktop (and thus the cursor on the screen) to pick commands and select text on the screen. The process becomes automatic. The mouse lets the visual, space-oriented parts of your brain do some of the work and it gives you a chance to go easy on your fingers for a while.

Remember, though, that a mouse doesn't replace the keyboard. The mouse is simply a pointing device, so you still have to enter your text from the keyboard. And for some complex instructions, it takes much longer to select from lists of choices than to enter your commands directly.

What does all this tell you about selecting a word processor? Simply to look beyond the lowest price or the brand your best friend chose. Although you can always learn to work the way the program does, you'll find your time more pleasant and productive if you put a little effort into finding a package that seems to suit you and your needs. Even if a word processor resembles a business partner, you should still be the boss. ■

Steve Rosenthal writes five monthly columns about micrcomputers. His first book, tentatively titled Rosenthal's ABCs of Personal Computers, *is due out this spring. He lives in Berkeley, California and claims to have started word processing back in the days of paper tape.*

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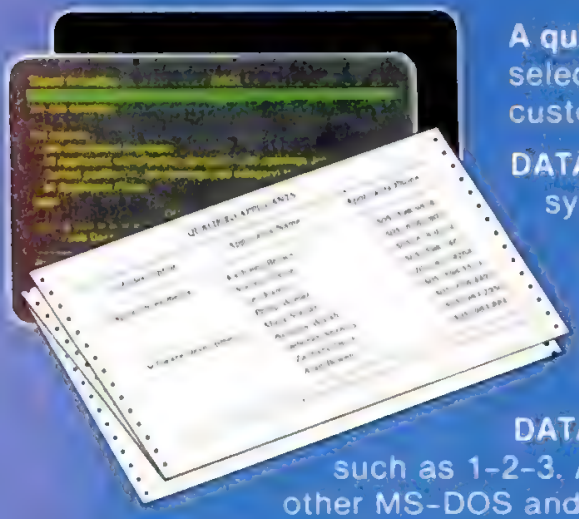

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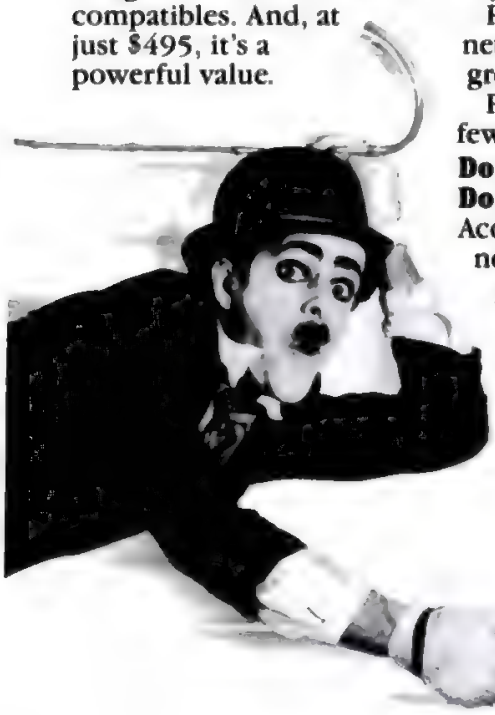

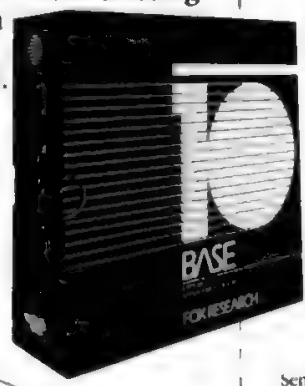

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Reading At The Speed Of Chips

A new speed reading course for the PC, called Speed Reader II, will have you absorbing best sellers and annual reports as fast as your micro can swallow a disk.

If Apple hadn't introduced its microcomputer in the fall of 1978, instructor Janice Davidson might have gone on teaching speed reading the same way she always had—with books and lectures.

As director of Upward Bound, a California organization dedicated to improving the Scholastic Aptitude Test (SAT) scores of local high school students, she decided that teaching speed reading techniques would improve test performance, so she instituted a program using traditional teaching methods. However, when she first saw the Apple II, an alternative occurred to her: Computers could offer significant improvements over the conventional methods of teaching speed reading. Davidson's idea eventually resulted in a program called *Speed Reader*, which is now available as *Speed Reader II* for the IBM PC.

Davidson realized that computers would enable students to work at their own pace; software could be programmed for

individual variations in age and reading ability. Students could compete against themselves rather than against peers who might be more or less advanced. Davidson bought an Apple II and began to experiment by designing speed reading exercises. She teamed up with professional programmer Richard Eckert, Jr., and they finished their first version of *Speed Reader* late in 1979.

At Upward Bound, the program was an immediate success. Davidson virtually guaranteed that students' reading speeds would double without any loss of comprehension. Often, however, results were better than that. Used in conjunction with vocabulary-building exercises and math drills, *Speed Reader* improved SAT scores, too. In many instances, scores jumped by as much as 100 points—enough to move a student from the mid to the high range. Equally noteworthy was that the program helped improve scores for students whose results were already in the 1200-point range.

Going Public

In the spring of 1982, Davidson and Eckert decided to offer *Speed Reader* to the public. They leased the program to Apple for distribution, but a year later they bought it back. It became the first release of their new software publishing company, Davidson & Associates. The company is now selling versions of *Speed Reader* for the Apple, Commodore, and PC.

To widen her sales base Davidson must convince potential buyers that *Speed Reader* can be useful to people who aren't taking the SATs. She believes its usefulness is obvious. "If you have a 6-inch stack of magazines on your desk, it's nice to finish reading them before the next stack arrives," Davidson commented. Although the program is not tailored specifically to the executive, the exercises will teach anyone to quickly read any type of material.

The *Speed Reader* package includes the program disk and a data disk filled with reading materials aimed at specific age groups. Some of its practice drills are designed specifically for adults, although Davidson insists that even high school lev-

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   - ☐3. *Agriculture, mining, construction
   - ☐4. Transportation
   - ☐5. Communications
   - ☐6. Utilities
   - ☐7. Computer related retailer
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   - ☐ 9. Finance, banking, insurance, real estate
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   - ☐12. Education
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- ☐C. Establish specifications
- ☐D. Approve purchase
- ☐E. Acquire them
- ☐F. Other involvement _____
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- ☐ 3. Data Base Management
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el reading exercises provide good training for the average grown-up. Both the high school and adult material is written on the eighth to tenth grade level. For most of the information that people encounter day-to-day, this is advanced enough.

Speed Reader is simple to operate. According to Davidson, this program, like conventional speed reading methods, trains people to read faster by changing the way they look at a line of type. Instead of studying one word at a time, as many slow-but-normal readers do, with *Speed Reader* students are instructed to focus their eyes on a central point in the middle of a group of words. Then, by developing their peripheral vision—known among reading professionals as "eye span"—students learn to take in words on either side of the midpoint. By cutting down on the amount of shifting and refocusing the eyes have to do, *Speed Reader* helps quadruple some students' reading speeds.

Traditional Format

According to Davidson, the program's format is not unlike that of a typical speed reading class. Lessons are divided into sections: warm-up exercises that strengthen peripheral vision; practice sessions to improve eye movement across the page or screen; and reading lessons that first use narrow vertical columns and then regularly formatted text.

The package offers two kinds of warm-up exercises, one that flashes letters and one that flashes words. If you choose letters, you focus your eyes on a flashing square (a block cursor) and prepare to read. Depending on the level of difficulty selected, anywhere from two to four letters will quickly blink on and off. You type into the blanks the letters you remember seeing on the computer's screen. If you answer correctly, you move automatically to a higher blinking speed. (Top speed is 15.) The exercises operate like a game: Every time you get the letters wrong, the blinking speed drops down a notch. If you're at all competitive, you'll soon find yourself struggling to climb the speed ladder as quickly as you can.

Speed Reader's eye movement lessons emulate the traditional tachnistoscope, which projects words and phrases on a screen at varying speeds. "With the tachnistoscope, which uses one large screen for a group of people, everyone had to follow the same pace," Davidson noted. With the PC, it's possible to vary the pace to match the individual's skill.

The first exercise that reveals large amounts of text at one time is the column reading lesson, another peripheral-vision builder. Words are arranged in a long, narrow, vertical display. Your eyes roll down a line running—visibly or invisibly, depending on your choice—down the middle of the screen, and you hope your peripheral vision is working well enough to catch the words on either side.

In the *Speed Reader*'s sections, the Reading Passage Lesson and the Timed Reading Test, users scan text as it might actually appear on the page. In the reading lesson, you can set the number of words per minute you'd like to read—anywhere from 100 to 2,000—and indicate the number of lines of text you'd like to see on screen at any given moment. Without extensive practice, more lines usually mean lower scores.

Testing Yourself

In the timed test, you press the space bar to advance the screen, and the computer flashes up your words per minute score. To see how well you've read, you can take a short comprehension test with multiple choice questions about the material you've covered. In the questions section, said Davidson, "We test for three skills in reading comprehension: the ability to recall facts, to recall main ideas, and to discern implications."

Since Upward Bound used *Speed Reader* extensively for nearly 3 years before Apple offered it to the public, the package arrived in the stores in a highly polished form. The students at Upward Bound form a large, dedicated, and appreciative pool of program evaluators. "They showed me absolutely hundreds of things," said Davidson. For example, in the word-reading warm-up exercise, Davidson originally tried to build perception by flashing easily recognizable phrases such as, "time after time" or "play it again." Before long, however, she realized that students were memorizing the phrases the way they might memorize an eye chart. Once that happened, the exercise was useless.

To combat the problem, Davidson and Eckert came up with four 50-word data files—one each containing adjectives, nouns, verbs, and adverbs. *Speed Reader* draws words from those files at random to generate constantly changing phrases such as, "healthy people shout hastily" or "robust women walk cautiously." The words seem simple, but appearances are deceptive. If you stop concentrating on the blinking flasher, you'll suddenly realize that you didn't distinguish between the words *softly* and *slowly*.

According to Davidson, *Speed Reader* came into its own when it was adapted for the IBM PC. She is pleased with the features that Eckert's programming expertise has made possible—borders around the menus, the careful timing of the flashing of words on the screen, the full use of memory so that the disk rarely has to be accessed, and a clock that keeps track of elapsed time while students make decisions on the reading comprehension tests.

Davidson is particularly pleased that the user can now opt for dark letters on a light background, which makes *Speed Reader II*'s exercises look more like they would look on a printed page. This reverse field innovation wasn't possible on the original Apple program. Although she worried that the visual mechanics of speed reading on a computer might somehow be different from speed reading in a book, Davidson reported that her students haven't had any difficulty in making the transition from screen to page.

With at least one computer program, the printed page has the last word. ■

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Legal Aid: The Attorney's PC

Personal computers and all their accoutrements are slowly but surely making their way into lawyers' offices, replacing the ubiquitous legal pad and pencil with a keyboard and monitor.

Put the average lawyer at the keyboard of a PC and he'll probably leap to his feet with an objection. While other professionals willingly exploit the power of microcomputers for sophisticated problem solving, many attorneys remain convinced that no machine could ever rival their judgment and acuity. That's changing.

"The microcomputer is no longer just for large firms," said John Soma, a law professor at the University of Denver and an expert on computers and the law. "The IBM PC and other microcomputers are as powerful and as useful for case analysis, budgeting, and firm financial management as the mainframes. The only thing lawyers need is the willingness to use what's out there."

Not that computers are strangers in the law office. The word processor is probably better established in paper-intensive law firms than anywhere else, all but replacing the standard typewriter. Complex and frequently used documents are stored on disks or in centralized memory banks to be regurgitated at the press of a few buttons. In wills, trusts, and corporate work, where documents routinely run over 100 pages, the prospect of practicing law without a word processor is almost unthinkable.

Larger firms in particular have become dependent on computers to maintain their administrative functions. Court scheduling and deadline reminders are often computerized. With each attorney charging his time in segments as short as 6 minutes, the billing of clients is a perfect computer application. In many firms, each time sheet is prepared with scannable type and fed directly to an optical reader. Bills amalgamating all attorneys working on a particular case are compiled monthly, and each attorney receives a breakdown of his own time.

In both word processing and accounting applications, the lawyer depends on others to punch the keyboard while he pursues the courtly art of practicing law. But the image of the attorney armed only with pad and pencil is destined to change. With the advent of computer-assisted case analysis and computerized law libraries, lawyers who feel squeamish at the sight of a CRT will soon be left behind.

The first leap in computerizing the practice of law occurred 10 years ago when legal research services became available. Research terminals are now standard fixtures in the law office. The federal government maintains two databases for its own use: Juris, operated by the Department of Justice, and the 16 billion character Flite system, maintained by the Department of Defense. The two leading private services are Westlaw and Lexis, each sold to law firms on a per hour basis.

All the legal research systems operate on essentially the same principle. Cases, statutes, regulations, and rulings are loaded on the computer verbatim, an enormous and expensive task in light of the thousands of volumes that comprise a standard law library. The computer stores addresses of the words that make up the document, with the exception of a few "noise" words like *of*, *the*, and *a*, which appear so frequently that they offer no assistance in distinguishing one case from another. The user, after choosing what sort of documents he wants to research, types in a search request consisting of words or word segments strung together by "connectors."

For example, a lawyer who wanted all cases in which companies declared bankruptcy in order to avoid their labor con-

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tracts would type in the synonyms for the key words—*bankrupt, insolvent, union, labor, contract,* and *pact*—connected by symbols indicating whether the words must appear in the same sentence, the same document, or within a given number of words from each other. The remote computer will then compile all the documents that conform with the search request, which can be printed out as a list of cases or in complete text form.

Writing the search request is itself an art. A poorly conceived request can produce too many documents or worse, none at all. At their best, the systems save enormous amounts of time and provide definitive answers at a fraction of the cost of manual research. Westlaw has long been accessible with standard IBM equipment. Lexis uses its own hardware. Its simplified, one-button-per-function keyboard makes it so user-friendly that it is downright gregarious. Now that firms have begun to purchase microcomputers for other purposes, Lexis has been forced to back away from its original policy, and it is now accessible on an IBM PC equipped with a modem and the appropriate software.

Computerized Planning

PCs are also becoming handy tools for a law firm's internal planning. Properly programmed, a micro can reveal the economic ramifications of adding new partners to the firm or analyze the ability of a new client to pay his bill. Lawyers who do tax planning now use software packages to determine the tax ramifications of a proposed transaction. A client considering the purchase of an oil drilling tax shelter can determine the after-tax effect of the deal. The software clues the computer into the subtleties of depletion, intangible drilling costs, and alternative minimum tax. A client planning his will can minimize the estate tax bite by taking full advantage of the exemptions offered in the Internal Revenue Code.

As the cost of litigation has become a major factor in the financial planning of large businesses, computers have found a new role managing litigation. In complex lawsuits where literally thousands of documents will be offered as evidence, computers are used for storage and retrieval. More sophisticated programs purport to assess the prospects of winning or losing the suit and to influence the amount of the award the client can expect to pay or receive. These programs are somewhat limited by their attempt to quantify the most subjective human functions—a jury deciding how much to award the plaintiff as compensation, for example. But in medical malpractice cases in particular, services that will perform this type of analysis are finding great success in predicting the range of possible judgments.

A client can minimize the estate tax bite by taking full advantage of the exemptions offered in the Internal Revenue Code.

"It's better than saying 'the case is worth about $100,000,'" said John Soma, commenting on the unscientific finger-to-the-wind methods usually employed to predict success in litigation.

Soma also points to the psychological advantage of presenting a computerized analysis of possible success to a client faced with a lawsuit. "Give this to a chief executive officer, and he's ecstatic. They are used to the printout world." Personal computers have also proved valuable tools as warring attorneys approach the settlement of a case, both in calculating a fair settlement price and in discounting any proposed future payments to their present value.

The Future

What does the future hold for computers in the law? Researchers are already working on a national data bank that will store prefabricated forms. After the attorney responds to a series of computer-generated questions, the computer will pick the appropriate document and customize it to that client's needs. A companion system will print out any recent changes in the law that might affect the validity of the document. Eventually, the computer could track current law and change the forms appropriately on its own.

"That's the spooky world," said Soma, referring to new techniques in artificial intelligence. It's also the point where computer technology begins to impinge on the aspect of legal practice that lawyers so jealously guard.

The existence of extensive databases, storing both legal and lay literature, will also change the shape of the practice. "Soon almost all commercial lawyers will punch in a few facts on a new case and receive a crib sheet before the client even comes in," said Soma. "It will be available in 10 minutes; it's a great way to market the savvyness of your firm, and failure to take advantage of it would be possible grounds for malpractice." ■

Norv Brasch is an attorney. He is associated with the firm of Holme, Roberts & Owen, in Denver and Colorado Springs, Colorado.

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PC-File is quite modest in scope and easy to use. If you try *PC-File* and find that you like it, a $35 contribution to its author is requested.

Once you have a copy of the program, the steps I'll describe here should be enough to get you started.

The list in Figure 1 gives the names and lengths (in number of characters) for each of the fields of the records in the database that we will develop with *PC-File*. Last issue I explained the rationale behind each of these fields. Before using the program, let's look at what goes into each field.

First are the ID and name fields. Since the patient's identification number is a field that is certain to uniquely define each

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Requires: 64K RAM with PC-DOS 1.1, 96K RAM with PC-DOS 2.0.

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record, it will be known as the "key field" for the program. It can handle up to nine characters. By having last names and first name in separate fields, you can easily sort your lists of patients alphabetically by name.

The fields for date of birth (DOB), DATE1, and DATE2 will work best if you write them as six characters in the form of YYMMDD, with the year numbers first. For outpatients, use DATE1 as the date they were seen in clinic. For hospital patients, use DATE1 for the day of admission and DATE2 for the day of discharge.

The SEX field can use the abbreviations M, F, or U (for unknown, for the rare times when you can't remember). Likewise, use single-letter abbreviations for RACE.

If you only practice in one location, you won't need the SITE field. Otherwise, make a list of all the places you practice and assign each one a letter abbreviation or number, no more than two digits or letters long. Be sure that all your lists of codes allow for future additions.

Procedures and Diagnoses

There are five fields for diagnosis codes, D1 through D5. I defined these fields to hold three characters, which will allow you to use the position numbers in the ICHPPC coding system. You also can create your own system of codes, which can have up to 1,000 different items (000 to 999). Classifying diagnoses in an outline form, such as the 100s for infectious diseases, 200s for neoplasms, 300s for respiratory illnesses, and so on, will allow additions as the list grows.

I allow three characters for each of the three procedure fields, P1 to P3. It is easier to make up your own code list for procedures. The Common Procedural Terminology (CPT) numbers are too long.

The comments field is self-explanatory. Keep your remarks brief. If you find yourself frequently typing the same thing as a comment, it might be better to assign it a procedure or diagnosis code.

To use *PC-File*, put the program disk in your default drive, type PC-FILE, and press the Return key. You are asked to

The real test for a database manager is how well it makes reports from data. With PC-File, you get a list of patients ordered by ID number or name.

ID	9
LASTNAME	12
FIRSTNAME	8
DOB	6
SEX	1
RACE	1
SITE	2
DATE1	6
DATE2	6
D1	3
D2	3
D3	3
D4	3
D5	3
P1	3
P2	3
P3	3
COMMENTS	45

Figure 1: *Names and character lengths of the fields for the E-Book records created with* PC-File.

Field to select on:	DOB	D1	D2	D3	D4	D5
Compare how:	>	=	=	=	=	=
Compared to value:	440101	35	35	35	35	35
And/Or/End:	A	O	O	O	O	E

Figure 2: *Input for the List option of* PC-File. *Giving these six sets of instructions will cause the program to sort out all E-Book records of patients under 40 years old (i.e., born after January 1, 1944) with a diagnosis of breast cancer (ICHPPC code number 35).*

choose a database. If your data disk is empty, no choices will appear. Type in EBOOK and press Return. Now you can start defining your database.

The program requests a list of the field names and the maximum size in characters for each field in the record. Start by entering the key field name, ID. Then enter 9 as the field's size. Continue typing in the rest of the field names and sizes from Figure 1. To be able to identify fields consistently, it's a good idea to type all the letters as capitals by using the Caps Lock key. Later, when you have to identify field names, be sure the letters you enter are capitalized.

When you come to the main menu, press F1 or type ADD to start adding records to the E-Book. Lowercase letters will work fine for the data. You can correct mistakes at the end of each record or you can use the Modify choice from the main menu (type MOD or press F2) to go back and make changes. Be sure to back up your data files as described in the *PC-File* documentation.

The real test for a database manager is in how well it makes reports from the data. With *PC-File*, you can get a complete list of your patients ordered by ID number or name using the Sort option (type SOR or press F7) from the main menu, then using the List option (type LIS or press F6) to display or print the records.

Creating Reports

The List option starts by asking you to identify the fields you wish to see on the report, along with information on how to display it and where to print it. I suggest that you make up a standard report format that lists all the fields in your database record, then save it. Then you can call this report format by name from the disk.

After defining the report's format, you then answer questions to choose which set of records will be pulled out of the database for the report. The List option at the end of a report automatically gives a count of the number of records that met your criteria.

The most useful report that can be produced from an E-File is a list of patients with a given diagnosis or procedure. Say you want a list of all patients under 40 with a diagnosis of cancer of the breast. If you use the International Classification of Health Problems in Primary Care (ICHPPC) coding scheme, the number for this diagnosis is 35. Choose the List option from the main menu, then enter the report format and indicate where the report is to be printed. You can set up criteria that will select patients born after January 1, 1944 by looking for values greater than 440101 on the DOB field, then look through these records to see if the value 35 is in one of the five diagnosis fields (see Figure 2). You can use the logical operators And, Or, and End to link several specifications in one search operation.

With practice, you will find more creative ways to use *PC-File* and your E-Book by making more complex searches of the database. ■

Dr. Hepler is now working for an MBA at Drexel University in Philadelphia.

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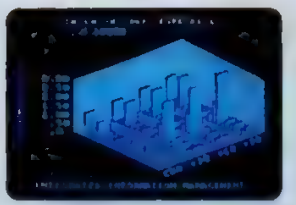

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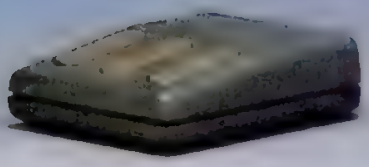

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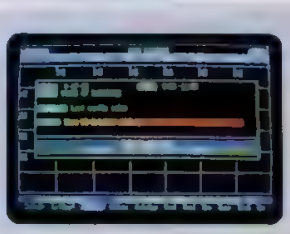

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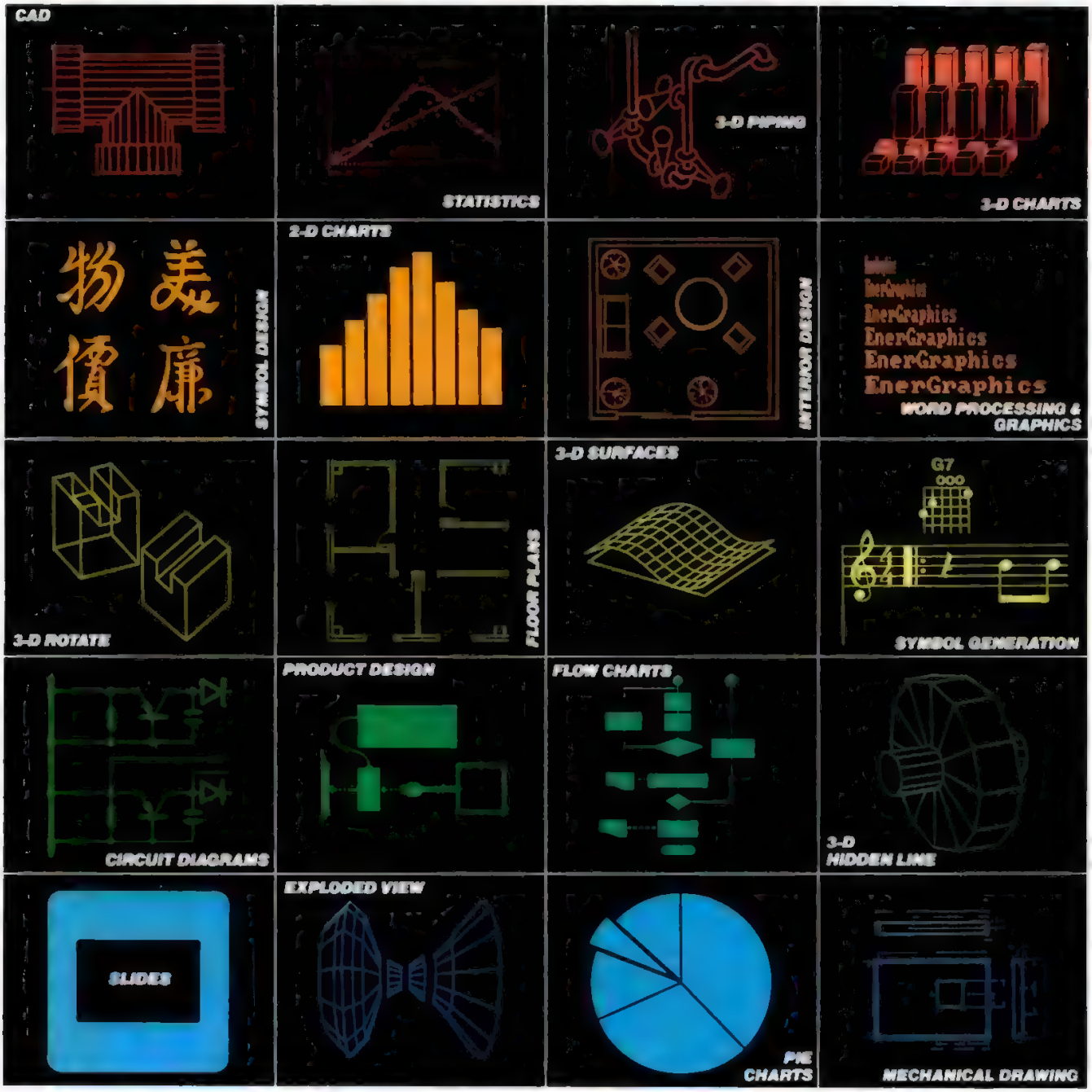

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Crunching Numbers On A PC

Despite their size and power limitations, statistical packages for microcomputers are challenging their mainframe cousins in the areas of economy, convenience, and single user control.

Statistics is a special branch of mathematics that condenses large collections of numbers into intelligible, descriptive quantities and relationships. Election-night projections, the monthly unemployment rate, and the Consumer Price Index are the work of statisticians who use computers for the millions of calculations required. The Bureau of Labor Statistics, the Census Bureau, and other government agencies collect thousands of pieces of information on each citizen and each business in the country. Simply storing the data accessibly stretches the limits of modern software and hardware, as does efficiently tabulating the information in understandable form.

Market researchers and public-opinion pollsters frequently work with much smaller volumes of data. And, although they generally do rather simple statistical calculations such as averages and percents, they require fast and efficient analyses so that their findings are timely.

Statisticians in universities and in industry often use high specialized techniques for analyzing data. Engineers in charge of manufacturing quality-control and sociologists who measure complex population characteristics have developed statistical methods to help them with their work, and they want software to include these sometimes esoteric procedures.

Though most statistical calculations are performed on mainframes that run special statistical packages, statisticians are now seeking ways to do their work on inexpensive microcomputers. Some software is available, but can small machines, even one as powerful as the IBM PC, take over all areas of statistical computing? Before attempting to answer this question, let's take a look at the mainframe packages statisticians have been using and review some of the microcomputer packages that are now commercially available.

SPSS' code runs tens of thousands of lines, requiring lots of disk storage.

SPSS and SAS

Two of the most widely used packages for large, mainframe computers are *SPSS* (Statistical Package for the Social Sciences) and *SAS* (Statistical Analysis System). Others for mainframes and minicomputers include *MINITAB*, *BMDP*, and *P-STAT*. In addition, some database management systems have statistical procedures as part of their report-writing capabilities, or have programs which can format data for use by statistical software packages.

SPSS was one of the first major software systems for statistical data analysis. Until recently, it ran primarily on IBM mainframes such as the model 360 and the 370. *SPSS'* code runs tens of thousands of lines, requiring lots of disk storage and memory for execution. *SAS* is of similar size, and then, they can run nearly every routine statistical procedure, such as regression, ANOVA (analysis of variance), time-series analysis, statistical graphics, and correlation analysis.

Many government statisticians and economists, market researchers, and public-opinion pollsters use *SPSS* or *SAS* to tabulate survey responses or perform regression analysis. Sociologists, industrial statisticians, and managers in business and finance also depend upon these programs. Each of these professions has special needs for analyzing data.

Nonstatisticians in business and finance use *SPSS* and *SAS* to project profits, to develop models of expenditures or inventory requirements, and to predict business conditions.

Both systems are designed for batch processing, which means several analyses are requested at one time, and the whole job is submitted to the computer to run without interaction with the researcher. This method of processing can be fast and uses shared computer resources efficiently, but it does not permit the researcher to

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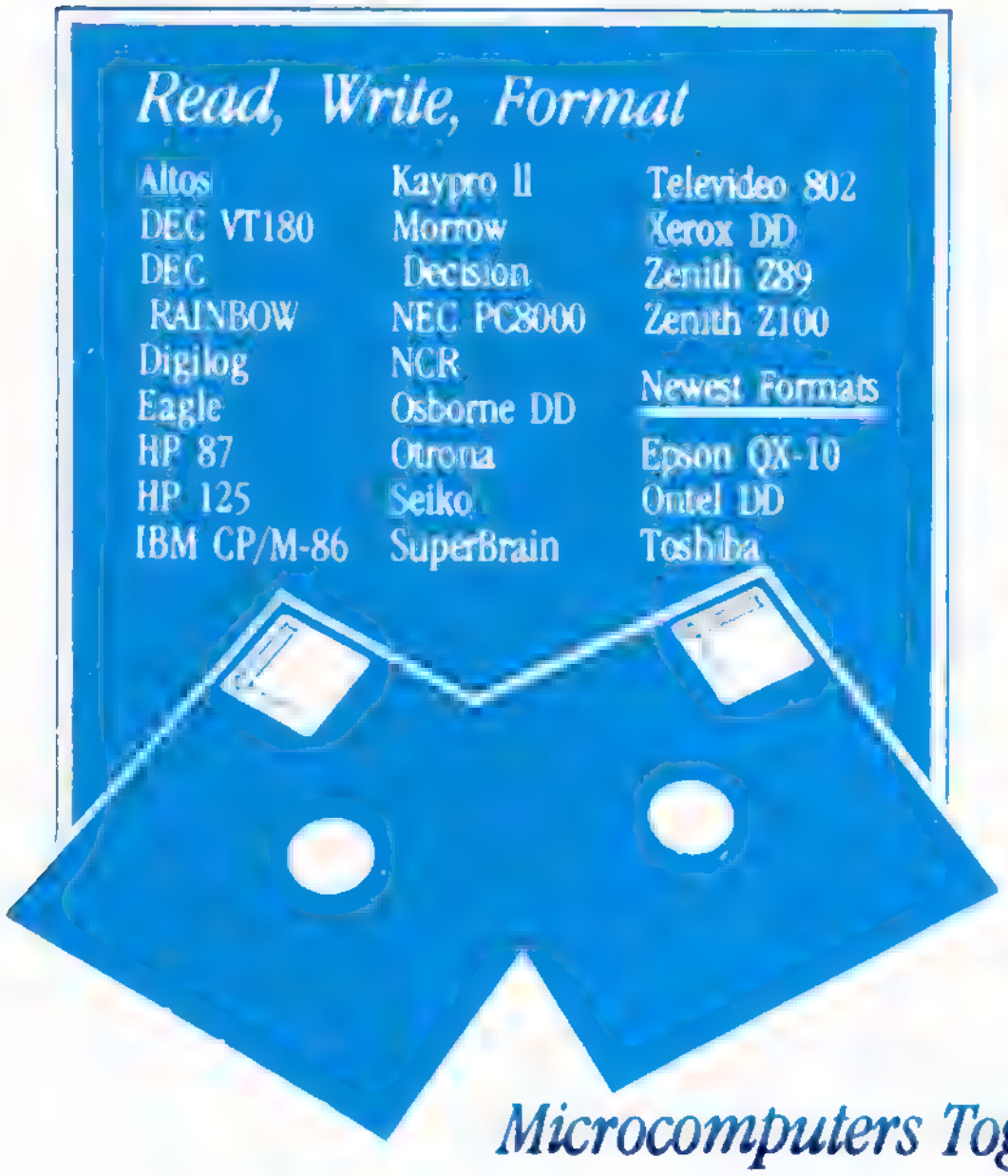

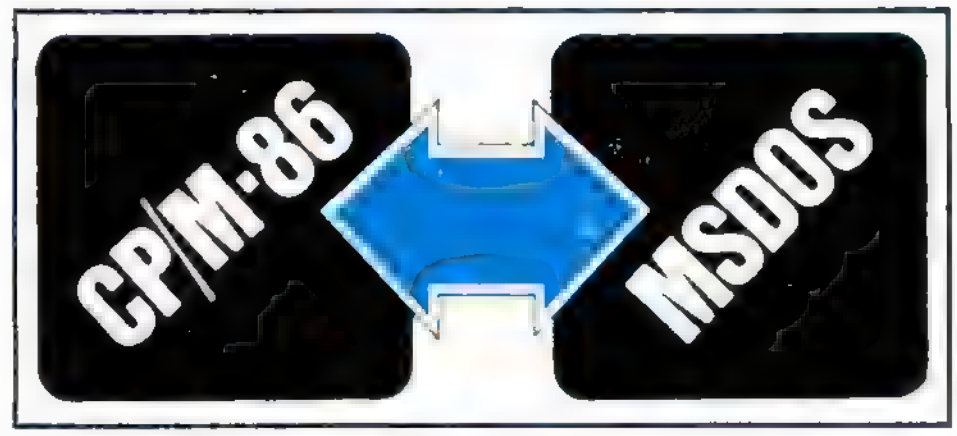

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easily use intermediate results to guide later data analysis. Interactive packages generally offer the user a 'menu' of several options for tabulating data. The researcher

A multi-user system can be expensive. Some problems require huge amounts of memory and CPU time, for which there may be excessive time-sharing costs.

can select appropriate procedures as preliminary results indicate. However, at each step or item to be input, the user must interact immediately with the program.

Microcomputer Packages

The first commercially available packages for microcomputers, such as Ecosoft's *Microstat*, were interactive, menu-driven systems with limitations on the number of variables and cases they could handle. These limitations reflected the scarcity of good programming tools for smaller machines at the time; most of the statistical software for microcomputers was written in interpreted BASIC. More recent entries into the statistical software market, such as Mathematica's *MATHSTAT* and Walonick's STATPAC, use compiled BASIC. Although BASIC now has extended-precision variables and the ability to use up to 128K of memory, statistical procedures often require more memory and computational functions than BASIC compilers provide.

Since the introduction of the IBM PC, however, more powerful program-development tools for microcomputers have emerged. Compilers that use as much memory as the PC will hold (nearly a full megabyte), that use the 8087 floating-point processor for increased speed and accuracy, and that include special computational features for handling matrix operations are revolutionizing the statistical software market. In addition, with the increased memory and storage capacity of the PC, batch processing as well as interactive data analysis are now possible on a desk-top system.

SPSS, Inc. is now marketing a version of its software for Digital's PC-350 microcomputer, and this spring the company will offer *Micro-SPSS* for the IBM PC. The package will require 320K of system memory, the 8087 coprocessor, and a 5 megabyte hard disk. This version will use the same commands as the mainframe version, except for those that refer to disk data files. And, although *Micro-SPSS* will have some limitations on the number of variables and cases it can handle, it will be among the most powerful data-analysis tools ever to run on a microcomputer.

Micros vs. Mainframes

Although the power of microcomputers is ever increasing, in some situations mainframes are still preferable. Mainframe hardware and software have obvious advantages in speed and storage capacity. A mainframe running *SPSS* can produce many tabulations from a single reading of a large data set. Also, since such a large number of small companies and individuals are writing and selling software for micros, many users still place more trust in mainframe software developed and supported by well-known professional programmers and statisticians.

A large, multi-user system can be extremely expensive, however. Some statistical problems require huge amounts of memory and CPU time, for which there may be excessive time-sharing costs. Also, overcoming the administrative problems of using such a system can delay important data-analysis projects.

Microcomputers, on the other hand, are inexpensive, nearly instantly available to the data analyst and allow a single user to control all aspects of a project. Microcomputer options like the 8087 numeric coprocessor, incorporate state-of-the-art standards for computational methods de-

Microcomputers can do much of the statistical work formerly done on mainframes, but some tasks such as processing large databases, can only be done on larger machines.

veloped by the Institute of Electrical and Electronics Engineers. Since such standards are not implemented on some older mainframes still in use, statisticians often prefer the micro over the mainframe.

The size and complexity of a data set a statistician must analyze will ultimately determine the size of the machine needed to do the job efficiently. In general, data consisting of a few dozen variables and less than two thousand records can be easily handled by the IBM PC running such packages as Anderson-Bell's *ABSTAT* or Walonick's *STATPAC*. Analyzing larger data sets may require the IBM PC or XT running *Micro-SPSS*.

Microcomputers, especially those like the PC, can perform much of the statistical work formerly done on mainframes, but some tasks such as processing large, shared databases, can only be done on the larger machines. However, as microcomputers become more powerful, most statisticians will prefer to do their work on smaller, single-user machines. ■

Harry J. Foxwell is chairman of the Capital PC User Group's Special Interest Group for Statistics.

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Automated Stimulation, Armonk, Avalon Hill, Blue Chip, Broderbund, Data Most, Infocom, On Line, Spinnaker Software, Sierra/On-Line, Sublogic, etc. ...

BOARDS

AST Research

ComboPlus 64K Clock/ Calendar, Serial & Parallel, I/F, Expandable to 256K ..... $ 279
MegaPlus 64K, Clock/ Calendar, Serial Port, Expandable to 512K w/Megapak 269
Extra ports available for Megaplus and I/O Plus II includes Game, Parallel & Serial 40

LNW

Busboard 64K ..... $ 289
Asynch Module 67
Parallel Module 42
Clock Module 58
Co-Processor Module .. 196
Floppy I/O Module 48
Auto-answer, Autodial 300 bd Modem Module 119
16 Channel Analog Module 92

Maynard Electronics

Floppy Drive Controller $ 155
Floppy Drive Controller w/Parallel Port 209
w/Serial Port 219
Sandstar Memory Card – 3 modules cap. ... 194
Sandstar Multifunction Card – 6 modules cap. 93
Sandstar Modules ..... $ Call

Quadram

Quadboard 64K, Clock/Calendar, Serial & Parallel Ports, Software ..... $ 279
Microfazer Stack Printer Buffer (exp. to 512K)

COMPLETE SYSTEM CORNER
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Includes: Star Micronics Gemini 10X Printer, Hi-Res Green Monitor, Cables, I/F, etc.

System A: Corona Desktop PC-2, (2) 320K-Drives, 128K Memory, Hi-Res Monitor, Graphics, Serial/Parallel Interfaces, MS-DOS, GW Basic, Word Processing and PC Tutor Software ..... $ Call

System B: As above, but portable ..... $ Call

System C: As above, but with 10 MB hard disk instead of second drive ..... $ Call

System D,E,F: Columbia similar to above configuration, but includes Super 3000 Software Pak ..... $ Call

Megapak 256K upgrade for Megaplus ..... $ Call
I/O Plus II Clock/ Calendar and Serial Port 115

- Parallel/Parallel 8K .. 132
- Parallel/Parallel 64K 188
- Serial/Parallel 8K 170
- Serial/Serial 8K 170

DISPLAY CARDS CORNER

Hercules Graphics Board ..... $ 359
Orchid Monochrome Graphics Adapter 360
Plantronics Colorplus 389
USI Display Card (color/monochrome) ..... $ Call
Amdek MAI Card ..... $ Call
Tecmar Graphic Master ..... $ Call
Quadram Quadcolor I ..... $ Call
Quadram Quadcolor II ..... $ Call

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Hayes Smartmodem 1200/Hayes Smartcom II Software, AST I/O Plus II Clock Calendar and Serial Port ..... $ 689
Above w/Smartmodem 300 399
Hayes Smartmodem 1200 & Smartcom II Software ... 575

Quadlink 64K Memory, Game port allows Apple Software to run on IBM/PC ..... $ Call

Tecmar Products ... $ Call

Xedex/Microlog

Baby Blue ..... $ 425

Tall Tree

512K JRAM Mem Board $ 699

MONITORS

Amdek Video 300A Amber ..... $ 149
Amdek RGB Color II .. 425
NEC 12" Hi-Res Green . 187
Sanyo 12" Hi-Res Green 199
USI Hi-Res 12" Amber 159
NEC JB-1260 Green ... 119
PGS RGB Color ..... $ Call
NEC JC-1216 RGB 475
Quadram Quadchrome ..... $ Call
Taxan 12" Amber Monitor 149
Taxan 12" Green 136
Taxan 12" Med. RGB .. 323
Taxan 12" High RGB .. 512
Taxan RGB Cable for PC 17
Sony Profeel 12, 19, 25" ..... $ Call
Panasonic ..... $ Call

MODEMS

Hayes Smartmodem 300 ..... $ 205
Hayes Smartmodem 1200 495
Hayes Chronograph .. 189
Novation 212 Auto-Cat 565
US Robotics Auto-Dial (full auto 300/1200) .. 459
US Robotics Auto-Link (auto-answer 300/1200) 410
US Robotics Password . 379

DISK DRIVES

Tandon TM-55-2 ..... $ 255
Tandon TM-100-2 239
Davong DSI-501 Hard $ Call
Davong DSI-512 Hard $ Call
Davong DSI-519 Hard $ Call
Corona 5 MB Hard ... 1,395
Corona 10 MB Hard .. 1,795
CDC 1800 270
Corvus ..... $ Call
Tall Grass ..... $ Call

PRINTERS

Anadex ..... $ Call
C. Itoh Starwriter $1,149
C. Itoh Prowriter 8510 . 379
C. Itoh Prowriter 1550 . 689
NEC 3550 ..... $ Call
NEC 8023A ..... $ 475
Okidata
Microline 82A ..... $ Call
Microline 83A ..... $ Call
Microline 92 ..... $ Call
IDS Prism 80 (w/4 options) 1,399
IDS Prism 132 (w/4 options) 1,547
IDS MicroPrism 399
Silver Reed Daisy Wheel ..... $ Call
Star Micronics Gemini 10X 319
Star Micronics Gemini 15X ..... $ Call
GE Printers ..... $ Call
Epson FX-80 599
Transtar T-130-P 699
Transtar T-315P Color . 519
Transtar T120P 475
Mannesmann Tally
MT 160I 475
MT 160L 585
Spirit ..... $ Call

... and much more.

DISKETTES

3M 5" DS DD Box .... $ 40
BASF 5" DS DD Box .. 37
Maxell 5" DS DD MD2 Box 40
Verbatim 5" DS DD Box 35
Ultra Magnetic 5" DS, DD, Bonus Box (12 diskettes) 35

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Amdek X-Y Plotter .... $ 649
Enter P100 Sweet P 595
Panasonic Digital Plotter ..... $ Call
Strobe M100 Plotter (RS 232) 499

MISC.

Koala Technologies Graphic Tablet w/Software ..... $ 95
Chalk Board Powerpad 85
Chalk Board Starter Kit 39
Symtec Light Pen 140
TG Joystick 49
Kraft Joystick 56
VersaWriter Tablet ... 239
Keytronic WP Keyboard 209
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Flip 'n' File 5¼" 21
Alpha-Delta "MACC" surge protector 69

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Creating a micro and mini computer network has been costly and confusing. Communications hierarchy has prevented many types and various kinds of equipment from sharing information. Until now.

Introducing StationMate. One unit that joins mini computers, micro computers, terminals, and printers. It's transparent. So different brands and types of computers and peripherals can easily interface. StationMate allows you to construct a comprehensive communications network. *Inexpensively.*

Users can select the information they need from the unit they want. StationMate can address any port in the network either by its assigned digital code or by its common identifying name. So everyone has access to all the local or remote computers, mass storage files, and peripheral devices connected in the network. *Immediately.*

StationMate provides local area networking with XLAN™, the simple communications concept from Complexx. All you need is StationMate and an inexpensive shielded-pair cable.

Besides local area networking, StationMate permits access to remote workstations via an internal dial-up modem. And it serves as a gateway for teleprocessing access to all LAN resources. You couldn't get all of this in one unit. Until now. And the suggested retail price is only $1,450.00. StationMate makes communications simple. *Incredibly.*

StationMate. The link you've been missing.

See your local dealer or contact Complexx for the name of the dealer or distributor nearest you. *Complexx Systems, Inc., 4930 Research Drive, Huntsville, AL 35805. 205/830-4310.*

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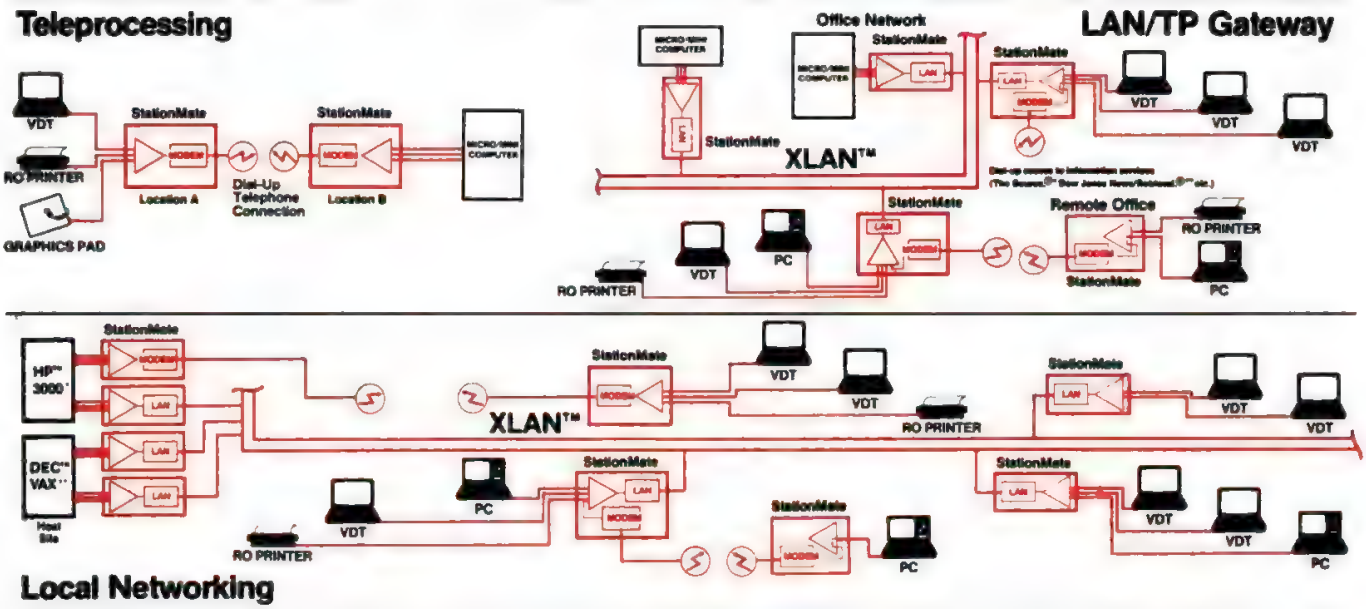

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CIRCLE 224 ON READER SERVICE CARD

New On The Market

HARDWARE

IBM 65/85-Personal Computer Attachment

An interface card for converting IBM Electronic 65 or 85 typewriters for use as a letter-quality output printer. When not in use as a computer printer, the IBM 65 or 85 can continue to be used as typewriters.

The hardware consists of a circuit board installed in the typewriter, and a 6½-foot cable connecting the unit to a user's system. Supporting software includes diagnostic routines contained on the IBM 65/85 Personal Computer IPL/Diagnostic Diskette.

When used as printers, the Electronic 65 and 85 operate at 15.5 characters per second. The standard carriage of either typewriter can accommodate paper as wide as 15.5 inches. A wide carriage, accommodating 19.1 inch-wide paper, can be ordered with the typewriters.

(List Price: Complete installation $345; circuit board, cable, with installation $285; software alone $60)
IBM Corp.
Information Systems Group
900 King St.
Rye Brook, NY 10573
(800) 426-2468
(914) 934-4000

CIRCLE 785 ON READER SERVICE CARD

***Teleport 300 Modem,** Teletone*

Teleport 300 Modem

A smart modem permitting users to entry data into their systems from remote locations using only a touch-tone telephone as the input device. The Teleport 300 can also accept conventional computer-to-computer communications using the Bell 103 protocol standard, and includes such features as auto answer/originate, transmission speeds from 75 to 9600 baud, and password security.

The Teleport 300 operates in one of two user-selected modes. In the first, conventional communications between computer systems, between the user and commercial databases, etc., are possible through programmed commands.

In the second mode, a user can call into the system from any touch-tone telephone, enter a log-on password via a special code, and then enter data into the system using the modem's DTMF-ASCII conversion capability.

(List Price: $349)
Teletone
10801 120th N.E.
Kirkland, WA 98033
(206) 827-9626

CIRCLE 799 ON READER SERVICE CARD

PC-8000

A mass memory storage device offering a maximum capacity of up to one gigabyte (1000 megabytes). The device is intended for applications requiring very large databases, for software development applications, or as a file server in large networks.

The PC-8000 consists of a single controller board and two disk drives with from 16 to 500 megabytes of memory capacity each. The unit is compatible with fixed/removable media devices, and offers an average access time of 17 milliseconds.

(List Price: $8,900 to $14,900, depending upon storage capacity)
National Memory Systems Corp.
355 Earhart Way
Livermore, CA 94550
(415) 443-1669

CIRCLE 788 ON READER SERVICE CARD

P-80 & P-132 Printers

Two dot matrix printers featuring color graphics capabilities. Bar, pie, and scatter charts, as well as other forms of graphics, can be printed out in an 84 × 84 dot per inch format. Both printers feature a high density, staggered 24 × 9 matrix printhead, and a dual-speed facility allowing high speed drafts to be printed at 200 characters per second, or near letter-quality documents at 150 cpi.

The P-80 and P-132 printers also provide several paper handling abilities, including a standard single-sheet feed that positions 8½ × 11 inch sheets for quick hand-loading, and an optional auto-sheet feed that can handle up to 200 sheets of paper automatically.

(List Price: P-80 $1,795; P-132 $1,995)
Dataproducts S.P.G.
Route 13 So.
Milford, NH 03055
(603) 673-9100

CIRCLE 784 ON READER SERVICE CARD

PN-IBM PerComNet Interface

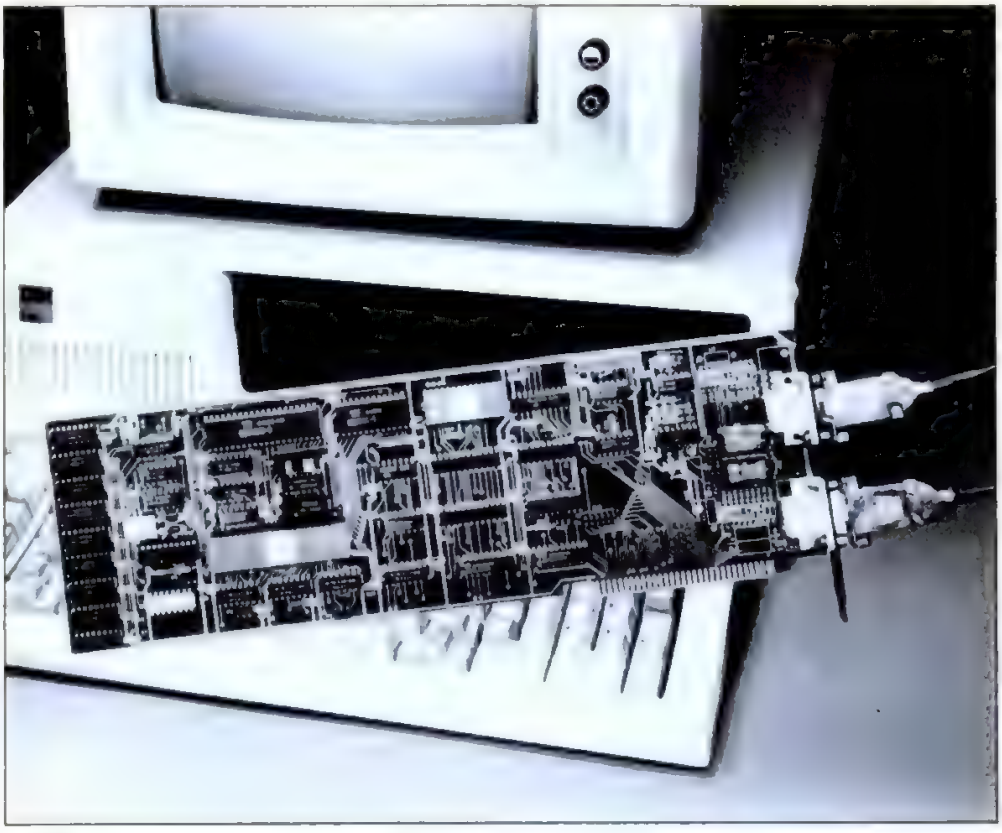
An interface card to link a user's system to the PerComNet local area network system. The card is based upon the Western Digital WD2840 Network Control Processor, and provides the means to attach the user's system into the network through a special cable interface.

Features of PerComNet include token passing reliability; a built-in 64K buffer, to speed data transmission; signal regeneration at each node to maintain high S/N ratio regardless of network size; NBS encryption for data security; support for simultaneous voice/data transmissions; as well as the ability to allow multiple users to share peripherals such as mass storage devices.

PerComNet can handle data transfers at speeds up to one megabyte per second at distances up to 10,000 feet.

(List Price: $595; Three system starter kit $1,695)
Percom Data Corp.
11220 Pagemill Rd.
Dallas, TX 75243
(214) 340-7081

CIRCLE 797 ON READER SERVICE CARD



PN-IBM PerComNet Interface, Percom Data

TAXAN RGBvision 420

A color monitor featuring high resolution capabilities. Specifications of the unit include 630 horizontal lines, .38mm dot slit, at 20 MHz bandwidth.

Other features include a black-stripe, non-glare picture tube, mode selector switch, contrast control, as well as horizontal, vertical, and screen size controls. The monitor's cabinet is styled to match an IBM PC, and the unit includes an IBM-type cable.

(List Price: $699.90)
TSK Electronics Corp.
18005 Cortney Ct.
City of Industry, CA 91748
(213) 810-1291

CIRCLE 791 ON READER SERVICE CARD

Automatic Power System

An uninterruptible power supply, the Automatic Power System can provide up to three hours of emergency backup power in the event of power outages. The devices are equipped with an internal 20-ampere battery, a battery charger, a static inverter which converts the battery's DC power into AC, and a power transfer switch.

Typical transfer time from line power to the Automatic Power Supply's inverter is four milliseconds, providing continuity of power. When line power is restored, the unit automatically switches back to the AC line and begins to recharge its battery. The unit is rated at 300 volt/amps, and plugs into any standard 120-volt outlet.

(List Price: $779)
Powermark
3855 Ruffin Rd.
San Diego, CA 92123
(619) 565-8363

CIRCLE 789 ON READER SERVICE CARD

TAXAN RGBvision 420, TSK Electronics

Cash+Plus

A complete point-of-scale hardware/software package for medium to high ticket item retail stores.

Cash+Plus comes with a cash drawer, interface card, and pre-printed invoice forms. The software captures customer data at time of purchase, as well as data on salesman, department, and item, with costs and margins. Reports include closeout, management summary, salesman, inventory, and accounts receivable summary, by day or month-to-date.

Other capabilities of the package include provisions for tax records, discounts, store transfers, split payments, serial numbers, as well as the ability to handle returns, customer deposits, ROA, and price quotations.

(List Price: $1,640; Four-part Invoice Forms $62.50 per 500)

Requires: 128K, two 320K drives, PC-DOS, 132-col. printer.

Paragon Software, Inc.
P.O. Box 273452
Boca Raton, FL 33427
(305) 392-0133

CIRCLE 790 ON READER SERVICE CARD

DecisionLink/34

An interface for linking a user's system to an IBM System/34 mainframe system. The device provides bi-directional, asynchronous communications to link up to 16 personal computers to the mainframe. Data files can be selectively up or downloaded between systems, and files are automatically reformatted for application programs running on the user's system.

The DecisionLink/34 consists of an intelligent front-end controller and software modules for both the user's system and the mainframe, and a proprietary database access module to the Systems/34 System Support Program. The controller interfaces to the System/34 via a single SDLC communications channel, and up to 16 personal computers via asynchronous modems or local cable connections. The controller performs multiplexing, file translation, code conversion, system security, and directory maintenance functions.

(List Price: 4 port model $7,500; 8 port model $8,500; 16 port model $9,900)
Laguna Laboratories, Inc.
1300 Normandy Pl.
Santa Ana, CA 92705
(714) 835-9100

CIRCLE 786 ON READER SERVICE CARD

Business Decision.

Let's be honest.

Despite the "personal computer revolution" in today's office, a lot of business decisions get made in some pretty arbitrary ways.

That's because most of the *software* for personal computers isn't up to the job of helping you draw conclusions from the mass of information in your business.

THE GREAT PERSONAL COMPUTER "UN-REVOLUTION."

Up to now, to use a personal computer effectively in the real world, you needed to use five different types of software packages: Electronic spreadsheet, information management, graphics, word processing, and telecommunications.

You had to learn how to use these five different, unmatched software packages before you could make the computer do what you wanted it to do.

And information stored in one of these packages would rarely fit into another without a lot of trouble.

This means you had to spend your valuable time pushing buttons and learning to become a computer expert.

Instead of using the personal computer as a tool for business decisions.

Not exactly a shining moment in the personal computer revolution.

THE CONTEXT MBA.™
A SIMPLE IDEA WHOSE TIME HAS COME.

The Context MBA is software for the IBM PC, PC-XT, and Hewlett-Packard Series 200 personal computers that combines all the functions you'll ever need - spreadsheet, information management, report writing, graphics, and communications - into a single, easy-to-use package.

The result is a software package that's literally "greater than the sum of its parts."

FIVE SCREENS - NO WAITING.

With the MBA you can connect your personal computer to your company's main computer and retrieve all kinds of business data. Like sales, product, or customer figures.

Sort, search, update, and store this information in your personal computer. Analyze it, prepare sales forecasts or study new business opportunities in minutes, instead of hours.

While you're using the spreadsheet, use the MBA's graphics function to make spreadsheet figures come alive on your screen in charts or graphs. So you can visualize the effect of possible changes to your business.

This year, or five years from now. Instantly.

When you've made sense out of the possibilities, use the MBA's full-function executive report writer to put these words, numbers, and graphs into a finished, printed report.

At last, you can use a personal computer as a decision tool to turn more profit from the mountain of information that crosses your desk every day.

So now even "non-computer people" can make heads-or-tails out of the personal computer revolution.

A GOOD BUSINESS DECISION.

Make a good, well-informed business decision right now:

Call us at ***1-800-437-1513*** (in California, call 1-800-592-2527), and get the name of your nearest computer store for a live demonstration of the Context MBA. We'll also send you a copy of our tell-it-like-it-is brochure, *Software Explained.*

If you have an IBM Personal Computer, ask for our free ***Context MBA Sampler Disk*** for a live demo of the MBA on your own PC.

CONTEXT MANAGEMENT SYSTEMS
23868 Hawthorne Blvd.
Torrance, CA 90505
(213) 378-8277

Context MBA™

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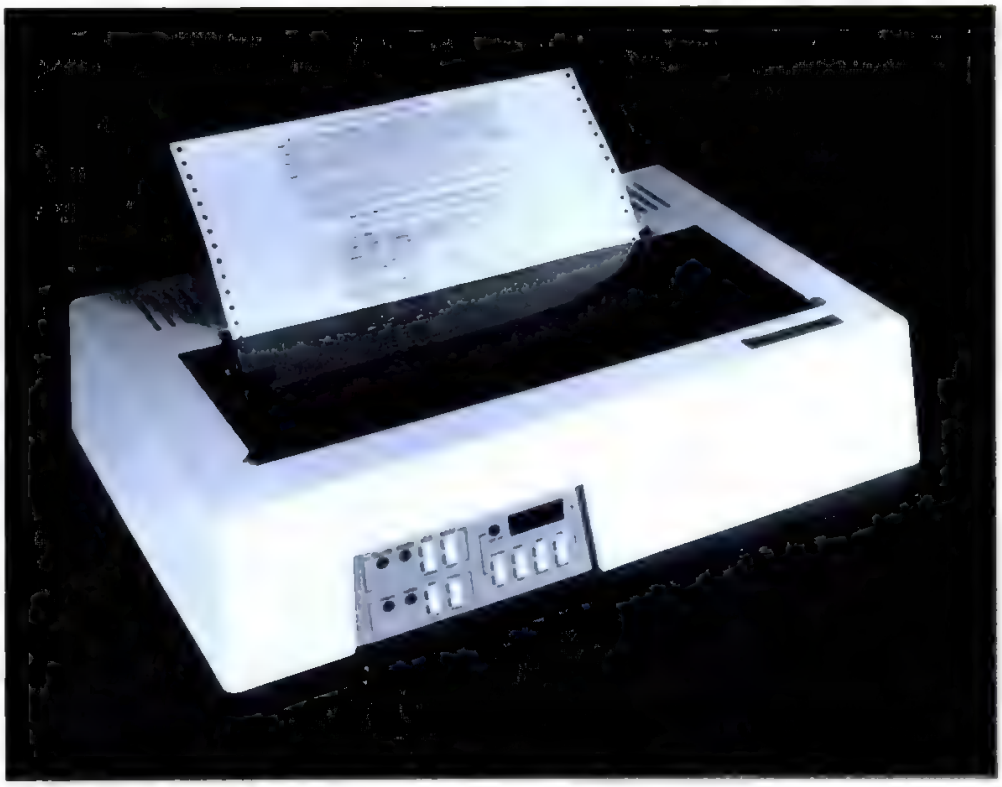
CIRCLE 105 ON READER SERVICE CARD



DS 220 Printer, Datasouth Corp.

DS 220 Printer

A multiple mode dot matrix printer, providing two speeds for printing of text, as well as dot-addressable graphics capabilities. In correspondence mode, the DS 220 generates an 18 × 48 dot matrix, utilizing a two-pass technique that operates at 40 characters per second. In high speed draft mode, the printer can produce hard copy at 220 characters per second utilizing bidirectional logic-seeking techniques. In this mode, the printer produces a 9 × 7 dot matrix,with throughput up to 450 lines per minute. Print pitch is selectable at 5, 6, 8, 10, 12, and 16 characters per inch.

The printer features resident multiple fonts, which can be called up from either front panel controls or through the user's software instructions. Included are two correspondence quality fonts, two memo fonts, variable pitch draft fonts, and a special micro-character set. Also resident are seven international character sets.

The high resolution dot-addressable graphics feature of the DS220 is compatible with most software, and includes the ability to print out spreadsheets with up to 217 columns, with graphic representation of results.

Front panel user controls include push-button access to 50 programmable features. These features include forms control, print mode and communications. The integral four-digit L.E.D. display provides visual verification of each feature programmed.

(List Price: $1,995)
Datasouth Computer Corp.
4216 Stuart Andrew Blvd.
Charlotte, NC 28210
(704) 523-8500

CIRCLE 798 ON READER SERVICE CARD

Qubie' PC 212A/ 1200 Modem

A plug-in board modem compatible with Bell 103 and 212A standards. The Qubie' PC 212A/1200 can operate at 300 or 1200 bits per second in full or half duplex, through four on-board microprocessors and included *PC-TALK III* software.

The modem is controlled with the same commands used with the Hayes Smartmodem, allowing compatibility with many programs written specifically for the Hayes unit. Included with the Qubie' board is *PC-TALK III*, a communications program that stores phone numbers, log-on information, saves to disk files, transmits from disk files, and which is capable of handling binary files.

The modem features auto-dialing in both pulse and tone, as well as keyboard dialing. Included is a serial port, configurable as COM1 or COM2, which can also be used for other peripherals when the modem is not in use. A standard telephone jack in the unit allows voice communications when data is being transferred or received.

(List Price: $299)
Qubie' Distributing
4809 Calle Alto
Camarillo, CA 93010
(805) 482-9741

CIRCLE 796 ON READER SERVICE CARD

THE CALCULATOR PROGRAM WITH A NEW TWIST - CONCURRENCY!

TEN KEY™

Tenkey is a calculator program which is totally integrated directly inside [illegible] application desired, press a special command key and instantly your computer becomes a calculator. When you've finished your calcula- [illegible] press the command key again, and your applications continues, as if it had never been interrupted. You may even transport the final calculator total back into your application. Finally, a practical use of

FEATURES

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- Tape display for double
- All Decimal Precisions
- Konstant
- Ability to transport final totals back to original

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- Saves time by allowing instant calculator capabilities at the touch of a finger.
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- Maximizes your personal computer investment by optimizing its capabilities.

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[illegible]	$319	[illegible]	$279
[illegible]	$469	[illegible]	$1079
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64K	$399	[illegible]	$515
512K		EPSON PRINTERS	
MX 512 + SP with SOFTWARE		[illegible]	$339
NO RAMS	$149	[illegible]	$575
64K	$189	[illegible]	$649
512K	$399	[illegible]	$779
IBM COLOR GRAPHICS CARD	$219	[illegible]	$879
IBM MULTI I/O BOARD		OKIDATA PRINTERS	
C + SP + PP	$189	[illegible]	$425
(Game Port & 2nd Parallel)		[illegible]	$599
IBM MULTIFUNCTION CARD		[illegible]	$699
64K to 256K S P P C C with Software		[illegible]	$1099
64K	$249	[illegible]	$859
ART		[illegible]	$999
Combo Plus 64K Parallel Serial & C C		STAR MICRONICS PRINTERS	
with Software	$299	[illegible]	$399
O Port Parallel Serial C C with Software	$195	[illegible]	$599
Mega Plus 64K S P P C C w Software up to 512K	$379		
Options SP PP CP each	$49		
ACT 4 AT 64K S P PP C C	$299		
Options Each port	$49		
HERCULES IN RES GRAPHICS w software	$429		
720 x 354 with PP			
FREEDOM COLOR PLUS 640 x 200 w software	$449		

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CIRCLE 412 ON READER SERVICE CARD

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The Disk Toolkit NO IBM PC Should be Without
Protects Your Software Investment

BACKUP TOOLS:
- Can Backup Most Every Diskette
- SUCCEEDS where others fail!
- Works Manually or Automatically
- Create "Protected" Diskettes
- Many Additional Analysis Tools

FILE TOOLS:
- Show Disk & File Allocation
- Display & Alter File Data
- Repair Damaged Disks
- Recover Erased Files
- Alter "Hidden" Status
- Search Files For Data

SECTOR TOOLS:
- Examine/Print Sector Data
- Modify (ZAP) Sector Data
- Compare, Copy & Zero Sectors
- Search Sectors For Data

HACKER TOOLS:
- Modify Floppy Disk Controller Parameters
- Supports All FDC R/W Commands

DISK MECHANIC works with all standard IBM PC disk formats including "protected" diskettes with mixed track and sector sizes, blank and high track formatting, CRC errors, and single or double sided drives. DISK MECHANIC requires an IBM PC with 128K of memory or COMPAQ with 192K of memory, DOS 1.10, and 2 floppy disk drives. DISK MECHANIC includes a detailed 48 page instruction manual. To Order DISK MECHANIC send check or money order for $70 plus $3 for shipping (Mass. res. add sales tax.) to: MLI MICROSYSTEMS, Box 825, Framingham, Mass. 01701 or Call (617) 926-2055 for Mastercard or VISA orders. Dealer/Distributor inquiries welcome. ©1983 MLI MICROSYSTEMS.

MLI MICROSYSTEMS

CIRCLE 340 ON READER SERVICE CARD

EasyCom/1

An interconnect device allowing a modem to be connected to a multiple line telephone. This facilitates data communications via modem without requiring leased or additional phone lines. The unit features simple installation between the phone's handset and phone base via a modular connector. A switch is provided to disable the handset once communication has been established, so extraneous noise is not introduced to the data stream. The EasyCom/1 can operate at any baud rate.

(List Price: $89.95)
Computer Business Solutions, Inc.
2262 Northwest Pkwy., #G
Atlanta, GA 30067
(800) 241-3239
(404) 952-9930

CIRCLE 794 ON READER SERVICE CARD

IDEAmini

A half-length multifunction I/O board. A combination of up to four of the following options can be configured on a single card: parallel interface; one or two serial interfaces; and a clock/calendar with battery backup. Each serial option comes with an RS-232C cable adapter with a DB25 type connector, and the clock/calendar option includes *ICLOCK* software on a diskette.

Every IDEAmini board includes the following: *RAMfloppy* disk emulation software; *ISPOOL* printer spooler software; and *ISWAP LPT1: LP2 printer line swap software.*

(List Price: one option board $175, to four option board $295)
IDEAssociates, Inc.
7 Oak Park Dr.
Bedford, MA 01730
(617)275-4430
Telex: 94 8245

CIRCLE 800 ON READER SERVICE CARD

PCScanner Model 240

A bar code scanner with an interface board that plugs directly into a user's system using one of the standard board slots. The model 240 Bar Code Reader provides data input to the user's application program as though it were from a keyboard—data translation and transfer is transparent to the hardware, software, and operating system.

The PC Scanner can also interface with a line of optical character readers from the manufacturer, providing the user with a range of scanning capabilities.

The model 240 PCScanner is available with two pens, for standard or high resolution scanning.

(List Price: Standard resolution $745; High resolution $785)
Caere Corp.
100 Cooper Ct.
Los Gatos, CA 95030
(408) 395-7000

CIRCLE 795 ON READER SERVICE CARD

***PCScanner Model 240,** Caere Corp.*

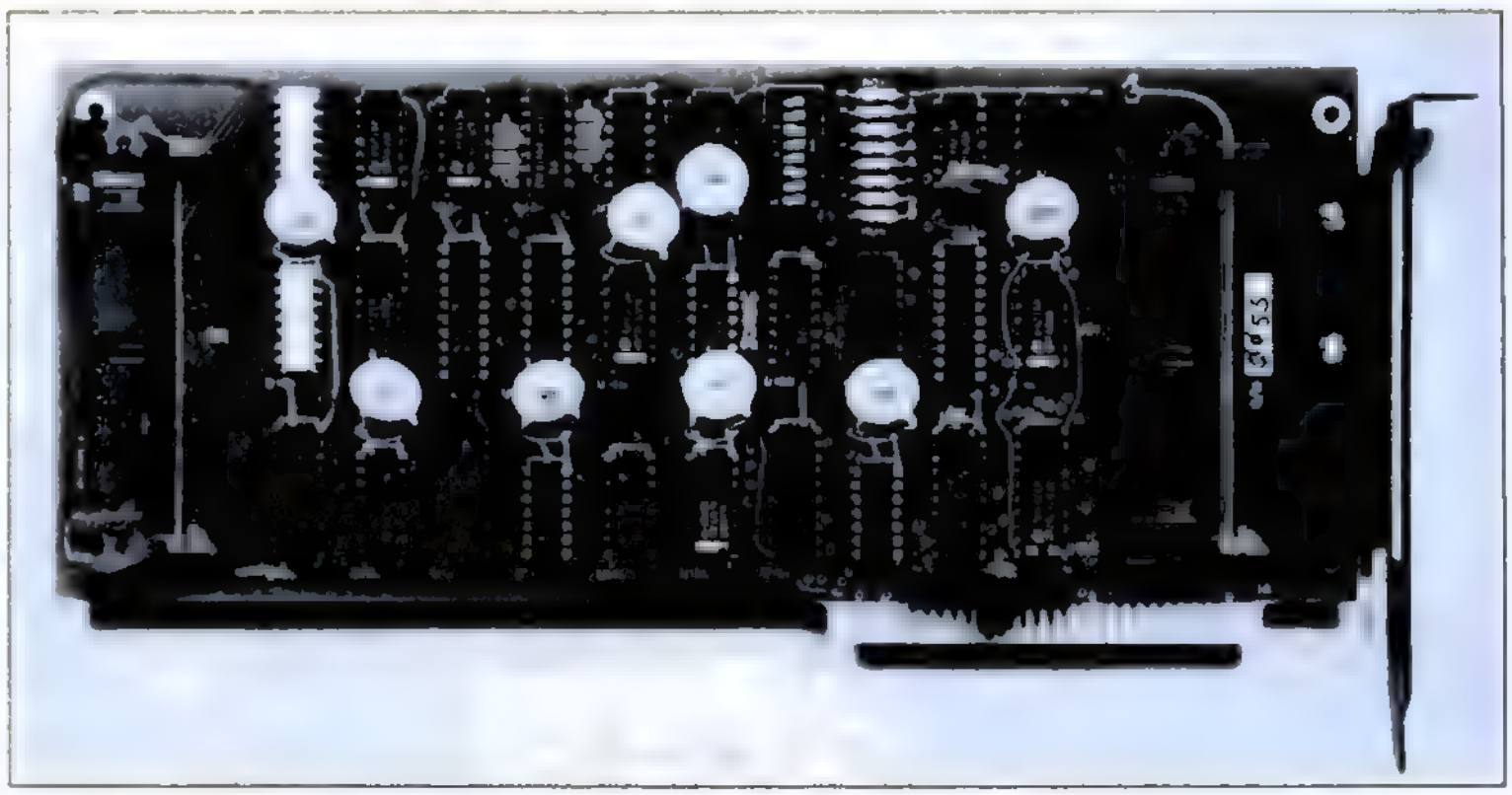
BARR/HASP

A hardware/software package permitting remote job entry from a user's system to an IBM mainframe system using MVS/JES2, MVS/JES3, and VM/RSCS operating systems, bypassing TSO and CMS. The BARR/HASP package includes a synchronous communications adapter board, software, and a user's guide. The software is menu-driven, allowing the user to select operations, commands, devices, and help information with single keystrokes. The hardware supports interrupt driven I/O for bysync, SDLC, and X.25 protocols in both full and half-duplex modes. A cyclical redundancy check is included for error-free communications.

BARR/HASP provides support for up to seven printers, with speeds up to 600 lines per minute on either serial or parallel lines. Printers can be dynamically assigned to selective output streams, and data can be spooled to disk for later printing.

Other features of the package include automatic sign on, data compression, line speed to 19,200 baud, support for color, and transparent transmission.
(List Price: $750)
Requires: 64K, one disk drive, PC-DOS.
Barr Systems, Inc.
2500 Blue Ridge Rd., #315
Raleigh, NC 27607
(800) BARR-SYS
(919)782-4462

CIRCLE 793 ON READER SERVICE CARD



TC-PC Tape Controller, Overland Data

TC-PC Tape Controller

A plug-in tape drive controller board, allowing users to store and retrieve data from ½-inch magnetic tape drives. The board can accommodate speeds up to 125 inches per second with transfer rates up to 200K bytes per second. Use of Direct Memory Access (DMA) techniques allow interrupt processing during data transfer.

The board is compatible with nine track formatted tape drives from a number of manufacturers. The complete package includes cables and interfacing software.
(List Price: $770)
Overland Data, Inc.
1425 Monte Rico Dr.
El Cajon, CA 92021
(619) 447-1908

CIRCLE 792 ON READER SERVICE CARD

Interactive Timing Analyzer (ITA)

A test instrument, controllable by a user's system, which can help pinpoint faults in hardware during design of microprocessor and microcomputer-based systems. The Model 220 ITA has 16 timing input channels, with a maximum 100-megahertz sample rate that uses a memory-efficient transitional timing mode.

The Interactive Timing Analyzer uses two basic data acquisition modes. The first has the 16 input channels sample data at 10-nanosecond intervals at a selected clock rate, acquiring 510 samples per channel in real time. A second mode, called transitional timing, stores data only when a transition occurs on a specified input line or lines. A counter is used to measure the time intervals between transitions.

The Model 2200 ITA is implemented on two plug-in cards that fit slots within the Northwest uAnalyst 2000 chassis. The uAnalyst chassis provides the electrical and logical interface between the ITA and the user's system, and is available separately.
(List Price: Two-card set plus probes $2,995)
Northwest Instrument Systems, Inc.
P.O. Box 1309
Beaverton, OR 97075
(503) 297-1434

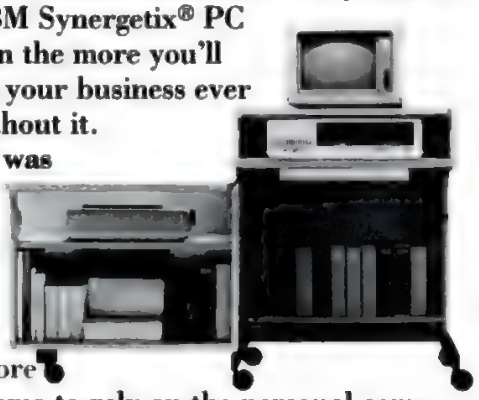
CIRCLE 783 ON READER SERVICE CARD

The IBM Personal Computer Work Station. It's optional. (But essential.)

Now, we could hard-sell you on its features. Or we could soft-sell you on its virtues. Instead, we're going to level with you.

You don't have to buy it.

But we have a hunch that the more you know about the IBM Synergetix® PC Work Station the more you'll wonder how your business ever managed without it.



Necessity was surely the mother of this invention.

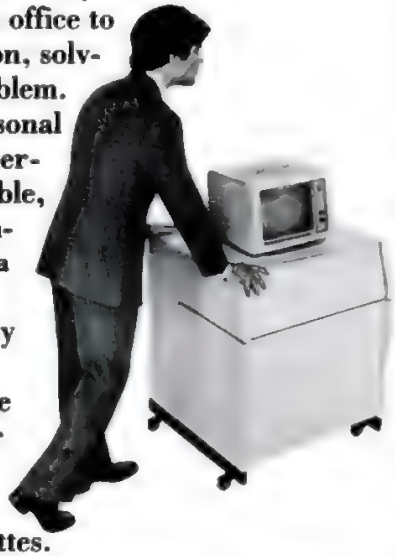
For as more and more businesses come to rely on the personal computer, new and extraordinary demands are being placed on the work environment itself.

The IBM PC Work Station was specifically developed to meet the challenges of today's technology. And scientifically designed to satisfy the various needs of the people who use it.

It's not just another pretty desk.

First and foremost, the IBM PC Work Station provides a convenient and compact work space that instantly opens up to expand your work area.

In addition, the IBM PC Work Station offers added mobility for your personal computer. So you get more mileage out of your investment as it moves from office to office, person to person, solving problem after problem.

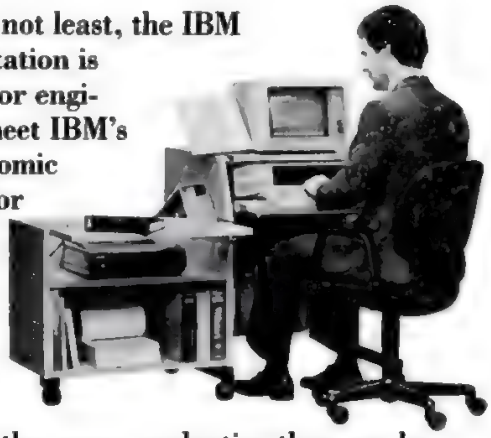


And since your personal computers are as vulnerable as they are valuable, the IBM PC Work Station also functions as a security device.

It deters pilferage by providing a self-contained lockable storage compartment for your CPU, software, keyboard, printer, program books and diskettes.

It also protects valuable information, prohibiting unauthorized access to confidential computer data by keeping it all secure under lock and key.

Last but not least, the IBM PC Work Station is human-factor engineered to meet IBM's strict ergonomic standards for operator comfort. For as you know, the more comfortable people are, the more productive they can be.



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305 S. State College Blvd. Suite 135
Anaheim, CA 92806
CIRCLE 341 ON READER SERVICE CARD

Program Execution Analyzer

A plug-in board that allows real-time dynamic analysis of a running program. The Program Execution Analyzer board contains a resident event buffer and video section, supporting either a dedicated or shared CRT monitor for event information display. The unit can capture up to 512 events leading up to and 512 events following the occurrence of a user-defined trigger qualifier. An optional 2048/2048 event buffer is available.

Independent trigger qualifiers include memory address, data memory read, memory write, I/O read, I/O write, regular and DMA access, with provisions for an external input. A special feature allows a delay of up to 65,536 trigger events to occur prior to event gathering.

Once triggered, the user may have the information contained in the event buffer displayed and/or printed. The event buffer is unaffected by soft resets (CTRL/ALT/DEL), allowing event analysis even after a catastrophic bug.

(List Price: $750; optional monitor add $100; optional extended event buffer add $200)

Micro Integrations Engineering Corp.
11 Clearbrook Rd.
Elmsford, NY 10523
(914) 592-8989

CIRCLE 787 ON READER SERVICE CARD

SOFTWARE

Super Encryptor

A file scrambler program, making the user's files unreadable to anyone lacking the correct user-generated passwords. Files are easily scrambled by nontechnical users, and several levels of security are available.

The program allows up to eight passwords, each of which can be up to 95 characters long. If large prime numbers are used for the password lengths, the combined passwords will not repeat for up to 10^{13} characters—larger than the maximum possible file size of 8 million characters. *Super Encryptor* allows passwords to be read from a disk file rather than having them typed in manually.

Also included in the *Super Encryptor* package is a password generator program which will assist the user in creating randomized passwords.

(List Price: $49.95)

Requires: 64K, one disk drive, PC-DOS.

Obsidian Computer Systems
236 N. Santa Cruz Ave., #243
Los Gatos, CA 95030
(408) 395-7900

CIRCLE 779 ON READER SERVICE CARD

Gold Letters

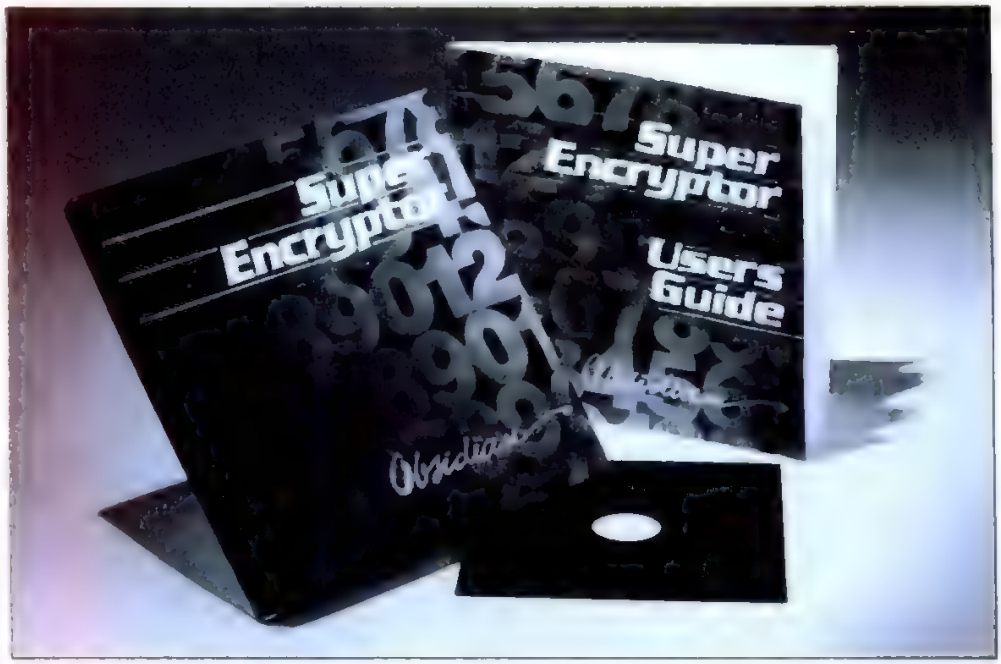
A collection of 101 business letters in 12 categories which can be easily accessed and customized by most word processing software. The letters are grouped in categories covering customer relations, sales, collections, marketing, legal and financial matters, and media. Each letter can be edited, and the edited version saved to disk, while the original remains in unedited form for future reuse.

(List Price: $159)

Requires: 64K, one disk drive, PC-DOS.

Data Base Industries
330 W. Felicita Ave., #D5
Escondito, CA 92025
(619) 480-9616

CIRCLE 762 ON READER SERVICE CARD



Super Encryptor, *Obsidian Computer Systems*

Day One

A database management and applications generating program featuring simplicity of use. *Day One* takes the user step-by-step through a series of task options in plain English beginning with basic tasks such as "create a file." The master menu pairs related options, such as "create a file," with corresponding actions steps, such as "fill your file." The software automatically proceeds to succeeding menus and sets of options necessary to complete an operation. Help screens are accessible from any screen.

The included tutorial covers computer fundamentals, including the equipment and its set-up; care, formatting, and backing up of disks; and running applications under *Day One*. A system of reference numbers links information as it appears on screen with corresponding lesson paragraphs in the tutorial.

Day One provides capacity for 65,000 records with up to 891 fields per record, up to 255 data bytes per field. With the software's "browse" function, files can be searched with up to 10 qualifiers. Other features of the software include security provisions; custom report generation; multiple file handling and scanning; utility functions to add records and to transport data from other software; provisions for deletion/recapture of records; and rebuilding files and data in the event of a system crash.

(List Price: Basic package $495; Advanced $695)

Requires: 128K, one disk drive, PC-DOS.

Day One Software, Inc.
Box AB
618 Shoemaker Rd.
King of Prussia, PA 19406
(800) GET-DAY1
(215) 337-8255

CIRCLE 781 ON READER SERVICE CARD

Aura 4 & 5

Two integrated software packages using a database managment system (DBMS) component with report generator as their focal points.

Aura 4 incorporates the DBMS, a spreadsheet component, a word processor, and a graphics component. *Aura 5* adds a three-mode communications program, which can support SNA/SDLC, bisynchronous and asynchronous communications, with host file transfer and 3270 emulation.

Unidirectional data updating allows a user to update the files used in any or all components simply by updating the DBMS component. This allows the spreadsheet component, for example, to perform "what if" analyses without having the speculative data affect the program's data files.

The application generator aspect of the DBMS component allows a user to define screens and reports, define function keys, and set up sort/select criteria easily. Both versions of *Aura* are primarily menu-driven for ease of use, and include Help screens in all components.

(List Price: Aura 4 $495; Aura 5 $995)

Requires: 192K, two 320K drives, PC-DOS, monitor, pixel-addressable graphics adapter (color or monochrome).

Softrend, Inc.
87 Indianrock Rd.
Windham, NH 03087
(603) 898-1777

CIRCLE 756 ON READER SERVICE CARD

***Day One*, Day One Software, Inc.**

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Stock Portfolio System, 2nd Edition

An assets management program providing the means to track an unlimited number of stocks, options, bonds, or mutual funds, as well as maintain cash accounts such as CD's, money market or bank accounts, within a single investment portfolio. Additionally, the program can manage up to three margin accounts.

Reports generated by the program include Current Portfolio Status, Profit and Loss Statement, Dividend Income and Interest Income, and Expense reports. Investment timing control aids provide the user with advanced notice of securities going long-term, dividend/bond interest due, and options expiring.

Stock Portfolio System also provides the user with the option of either manually entering quotes or automatically connecting to the Dow Jones News/Retrieval Service for price data. A terminal mode is provided for access to all Dow Jones services. Historical data may also be maintained within the program's files.

(List Price: $185)

Requires: 128K, one disk drive, PC-DOS.

Smith Micro Software
P.O. Box 604
Sunset Beach, CA 90742
(213) 592-1032

CIRCLE 761 ON READER SERVICE CARD

***J-BIRD**, Orion Software, Inc.*

New IBM Software

Four new releases designed to expand the versatility of a user's programs. The new software includes:

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- *Mailing List Manager*, allowing a user to store, retrieve, and print names and addresses on labels. The program is compatible with the *EasyWriter* and *PeachText* word processing programs.
- *VisiCalc 1.2*, an enhanced version of the spreadsheet program that can address memory up to 512K, and can be used with a hard disk. The hard disk residency capability allows both *VisiCalc 1.2* and data files to reside on a hard disk.
- *Exploring Your IBM Personal Computer*, a tutorial diskette to be packaged with new systems, providing first-time users with an introduction to the various components and features of the IBM PC.

(List Price: Word Proof $60; Mailing List Manager $195; VisiCalc 1.2 $200)

IBM Corp.
Entry Systems Div.
P.O. Box 2989
Delray Beach, FL 33444
(305) 241-7614

CIRCLE 771 ON READER SERVICE CARD

J-BIRD

A game program, wherein the player, controlling the *J-BIRD* figure, jumps from cube to cube of a three-dimensional pyramid, changing the color of the cubes. The *J-BIRD* is pursued by magic balls, jumping frogs, cats, snakes, and other creatures intent on subduing the player's character. Features of the game include composite and RGB color modes; joystick calibration; two player option; multiple play levels; and high scores saved to disk.

(List Price: $36.95)

Requires: 64K, one disk drive, color monitor, color/graphics adapter.

Orion Software, Inc.
P.O. Box 2488
Auburn, AL 26831
(800) 821-8088

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Includes payroll	✔	
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PRICE	$365.00	$399.00

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CIRCLE 288 ON READER SERVICE CARD

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Apple IIe Computers

- Typewriter-style, full ASCII keyboard, upper and lower case, auto repeat keys.
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- 16K Byte ROM (built-in Applesoft BASIC language)
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Franklin Ace 1000

- 64K Memory
- 40 column upperlower case display
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- Internal fan, more space between expansion slots for better cooling

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Serial 2199.00
Pacemark 2410:
Parallel $2399.00
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Smith-Corona:
TP-1 Parallel or Serial $349.00
Star Micronics:
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1201 Green $159.00
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Outstanding color for IBM . . . . . $Call

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Smart Cat 1200 Baud $455.00
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Password . . . . . $Call

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RETURNS: No returns on software. Customers must call for an RA number before returning any goods. We reserve the right to either repair or replace goods found faulty on receipt by the customer. We reserve the right to repair or return to the manufacturer for repair all goods becoming faulty within the specified warranty period. Any goods returned for restocking are subject to a 15% restocking fee at our discretion. Cancelled orders are subject to a 20% fee at our discretion.

CIRCLE 119 ON READER SERVICE CARD

Draft-Aide Pro 100, United Networking Systems

Draft-Aide Pro 100

A computer-aided-drafting program for plotting and editing engineering drawings. The software uses 110 Fortran subroutines combined with four external files. The externals contain two scratch files, one symbol file, and a drawing file. The symbol file can contain up to 500 active symbols which are created by the user and which may be accessed by name, eliminating the need to draw recurring objects.

The software's editing system provides extensive input and modification capabilities. Drawings may be stored on disk and plotted on a hard copy device. The user's CRT display is used as a graphics monitor for editing and viewing entered data. Drawing is accomplished by using external plotting facilities attached to the system.

Features of the *Draft-Aide Professional 100* program include basic primitives such as lines, circles, and arcs. Any part of a drawing can be grouped together into a design and rotated. Figures can be scaled up or down, or reproduced as identical copies anywhere on a drawing. Objects can be moved easily to try various arrangements in the design, and versions of the drawing can be stored for review or later modifications.

(List Price: $595)
Requires: 256K, two disk drives, PC-DOS, color or monochrome graphics adapter.
United Networking Systems, Inc.
7007 Gulf Frwy., #108
Houston, TX 77087
(713) 644-2427

CIRCLE 773 ON READER SERVICE CARD

CHem-Cost

An integrated product-costing program designed for chemical, paint, and adhesive manufacturers. The program provides formula, batch, and packaging cost information, as well as finished goods pricing. *CHem-Cost* is menu-driven, and allows for user modifications to meet special costing requirements.

(List Price: $495)
Requires: 64K, one disk drive, PC-DOS.
Silicon Forge
1 Software Pk.
Bethany, CT 06525
(800) 243-4788, ext. 215

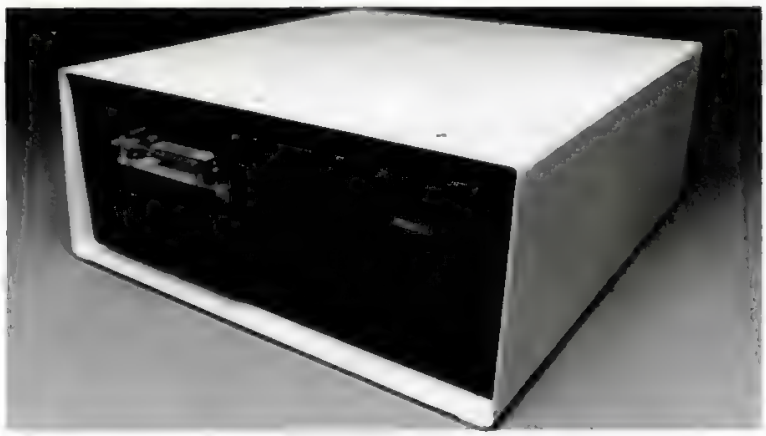
CIRCLE 760 ON READER SERVICE CARD

The Address Book

A database program capable of maintaining files by name, address, zipcode, phone numbers, and user-defined categories. Files can be searched, sorted, and printed in a variety of formats including: name only; name and address; name and birthday; total file; mailing label format; user-defined codes; etc.

(List Price: $29.95)
Requires: 64K, one disk drive, PC-DOS.
Integrated Systems Software
P.O. Box 61
Phoenix, MD 21131
(301) 467-2018

CIRCLE 763 ON READER SERVICE CARD



$1495 for a complete 10 megabyte hard disk system is a good deal — but not if you need 23 megabytes of storage!

That's why our 23 megabyte hard disk system is priced at only $2249. And for another $895, you'll get 23 megabytes of tape backup security.

The Pegasus 10 and 23 come complete with all the software and hardware you need to start operations.

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The price on these complete systems featuring the latest components just reached an all time low!

And you get everything you need to start working on your hard disk system:

- Top quality formatted fixed hard disk (ST506 compatible)
- Top quality controller card
- Software that runs on DOS 1.1 and 2.0, CP/M 86
- Host adapter
- Integral power supply
- Cables
- External custom chassis with additional space for either our tape backup, another hard disk, or floppy disk drive.
- 90 day warranty

What's the catch?

There is none. It's a simple matter of economics. Pegasus saw the growing need for mass storage, made a commitment to fill this need, purchased thousands of the finest quality hard disks, and is now passing the good deal along to you.

The only thing you may be missing in buying the Pegasus instead of the IBM XT expansion chassis is something you may not need in the first place: eight expansion slots, a communications card, three little initials, and an extra $1,000 to $2,000 out of your pocket.

But don't I need a tape backup for all that storage?

We recommend it! That's why we're offering you the same great deal on a ¼" cartridge tape backup. We've watched other companies offer 10 and 20 megabytes of storage and forget about the backup altogether. Our tape backup, which carries a 90 day warranty, retails for just $895 — a small price for over 23 megabytes of formatted storage and lots of peace of mind.

Where can I buy a Pegasus hard disk system?

Pegasus systems are available only through dealers. So contact the dealer in your area who sells IBM PC or compatible computers. If he doesn't have Pegasus, chances are he'll carry it soon. Just ask him to call us. We will ship him your Pegasus unit immediately.

Does Pegasus have larger storage systems?

Absolutely. 65 and 140 megabyte systems will soon be available from Pegasus. And the best part is that they, too, are breaking new ground when it comes to pricing. If you've outgrown 10, or even 23 megabytes of storage, ask about the larger capacity units. All with the same top quality hardware and software and full 90 day warranty.

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A DIVISION OF
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Hoffman Estates, Illinois 60195

Dealer Inquiries Invited **800-323-6836** In Illinois (312) 884-7272

CIRCLE 313 ON READER SERVICE CARD

Bombs Over Manhattan

A strategic defense game allowing the player to defend one of ten different cities: New York, San Francisco, Los Angeles, Portland, Chicago, Dallas, Washington D.C., or a city of the player's own invention. Once the city has been selected, three levels of difficulty are available: neophyte, moderate, or Idiot-Savant.

The player defends the city using the keyboard or joystick. Points are gained by intercepting falling bombs and missiles. Misses wipe out a fourth of the city, and the computer projects a body count at the top of the display. After four hits, the city is inundated by a color nuclear blast, accompanied by the music from the song "We'll Meet Again."

The game features a "Someone's Coming" Mode, which allows the player to switch to an incorporated word processing mini-program. The mini-word processor can be used to write, edit, print, and store data, up to 66 lines in length. The "Someone's Coming" mode can be accessed at any time during the playing of the game, and game play can be resumed at any time.

To win *Bombs Over Manhattan,* the player must accrue enough points to allow peace talks to begin. When accord is reached, any destroyed portions of the city are reconstructed, and the player advances to the next level.

(List Price: $29.95)

Requires: 64K, one 320K drive, PC-DOS, color monitor, color/graphics adapter.

Tamalpais Software
P.O. Box 02338
Portland, OR 97202
(503) 232-0021

CIRCLE 782 ON READER SERVICE CARD

Sfinks PC Chess

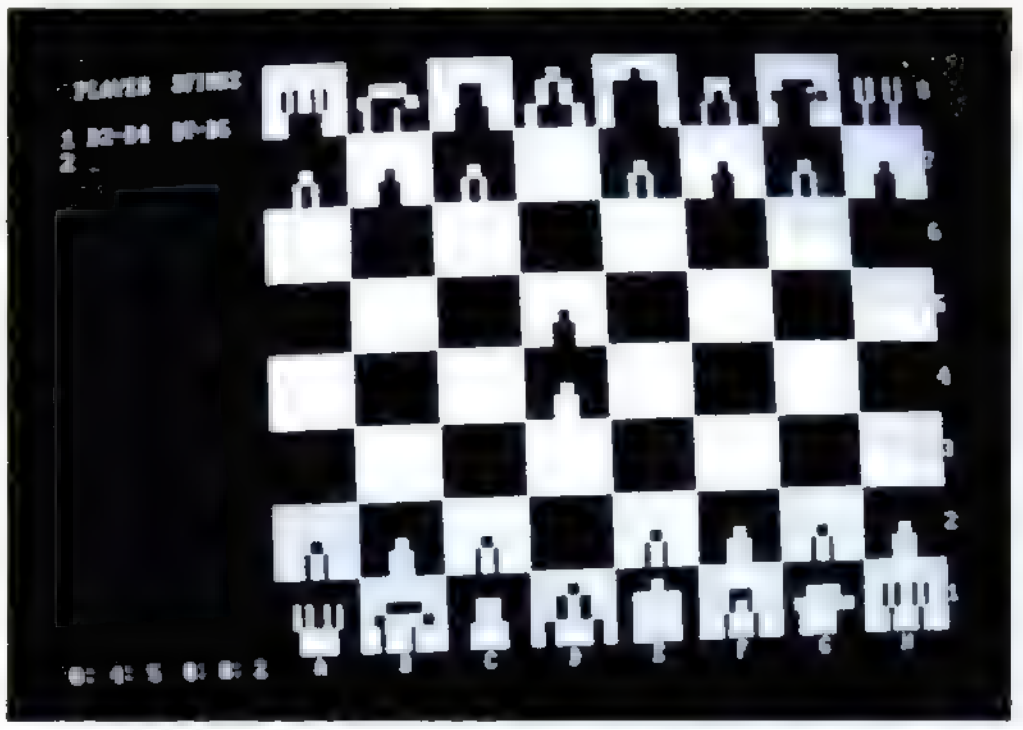
A chess game program compatible with both monochrome and color monitors. Features include a problem mode, infinite levels of play, a dual chess clock, optical printer output, optional audio signal, a save and restore game capability, multiple move take-backs, move suggestions, and algebraic notation. The program observes all United States Chess Federation rules of play, including castling, *en passant,* and underpromotion.

(List Price: $49.95)

Requires: 64K, one disk drive, PC-DOS.

W. Fink
1105 N. Main, #24-b
Gainesville, FL 32601
(904) 377-4847

CIRCLE 776 ON READER SERVICE CARD



Sfinks PC Chess, W. Fink

Query!^{2}

A general database management program allowing as many as 255 fields with 255 characters in each field. The program permits a total of 4,000 characters per record, which can be divided between the fields as needed. The total number of records per file is dependent upon space available on diskette, not on the amount of RAM available, as records are written to disk immediately upon initial data entry by typing R for record.

The database manager consists of eight separate program components, and permits the user to copy to disk only those components being used, to save disk space. The program components provided are: *CREATE*, for initial formatting of the databases's design; *ADD*, providing for the entry of data; *SEARCH*, a record-location utility capable of scanning records by up to 40 user-defined criteria; *VIEW*, for displaying records on-screen or directing them to a printer, as well as allowing a user to edit or delete records either one field at a time or the entire record at once; *RECOVER*, permitting the recovery of deleted records; *PURGE*, for permanent deletion of records and compacting the database; *SORT*, capable of rapid record organization based on data in any field; and *PRINTER*, a routine for printing output in a range of user-selectable formats and numbers of fields to be printed. *Query!*^{2} also includes five Help menus, advising the user of options available.

(List Price: $29.95)

Requires: 64K, one disk drive, PC-DOS.

Hoyle & Hoyle Software, Inc.
716 S. Elam Ave.
Greensboro, NC 27403
(919) 378-1050

CIRCLE 766 ON READER SERVICE CARD

The Inside Track

A collection of programs, routines, and utilities, a total of 61 in all on diskette, that can be called from interpreted BASIC or compiled languages. The source code for all programs on *The Inside Track* diskette is included with the package. The accompanying manual includes a chapter of hints for programmers working in 8086/8088 assembly language.

Subroutines included on *The Inside Track* can perform the following functions: read and write files; display data on-screen four to ten times faster than the BASIC "PRINT" statement; copy memory from one location (useful for screen swapping); and copy-protect diskettes. Programs included can reserve a block of memory for use as a program scratchpad; limit the memory used by compiled BASIC programs to eliminate reloading of COMMAND.COM, and to allow concurrent program loading; dynamically schedule up to four programs from within a program; including batch files (with PC-DOS 2.0); and delay the execution of a batch job until a specified time. There are programs for making the user's system into an alarm clock, and three different ways to reboot the system.
(List Price: $45)
Requires: 64K (128K with PC-DOS 2.0), one disk drive, PC-DOS (a few of the included routines specifically require PC-DOS 2.0).
Data Base Decisions
14 Bonnie Ln.
Atlanta, GA 30328
(404) 256-3860

CIRCLE 775 ON READER SERVICE CARD

Timelog

A timekeeping and billing program for professional offices. The program's features include time accounting with access to data by either client or type of work performed; user-defined billing formats; user-defined function keys; quick access to client lists; simplified editing procedures; and error trapping.

Bills can be generated for individual clients, all clients, or clients that have not been billed since a selected date. A billing summary is produced that gives a breakdown of who generated income by billable hours, and how much of the income covers costs or fees. Aged accounts receivable reports are also available.

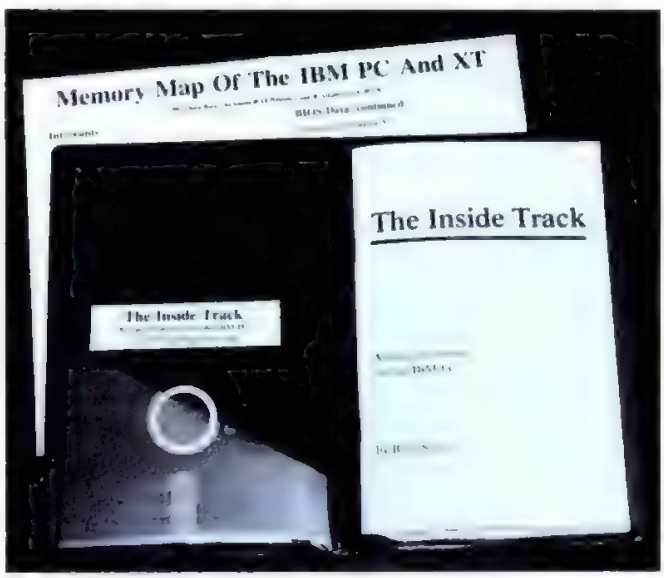
The *Timelog* program is written in compiled BASIC with machine code subroutines for the 8086 processor.
(List Price: $550)
Requires: 96K, two 320K disk drives, PC-DOS.
Gavel Computer Systems, Inc.
Rte. 2, Box 466
Alachua, FL 32615
(904) 462-4564

CIRCLE 738 ON READER SERVICE CARD

The INTERNIST

A program for medical/health professionals, allowing users to perform differential diagnoses on any combination of over 450 symptoms for 331 diseases. Based upon the Merck manual, the program also features a Disease Reference module which can display the symptoms associated with any of the diseases within the database. Diagnoses and references can be displayed and/or printed.
(List Price: $65)
Requires: 64K, one disk drive, PC-DOS 1.1.
N-Squared Computing
5318 Forest Ridge Rd.
Silverton, OR 97381
(503) 873-5906

CIRCLE 740 ON READER SERVICE CARD



The Inside Track, Data Base Decisions

Disassembly Cross-Reference System (DCRS)

A research tool for programmers working in assembly language. *DCRS* captures output from the DEBUG utility and prints a disassembly listing marking each referenced address. This is followed by a sorted cross-reference of all hexadecimal byte and word values appearing in the disassembly listing.
(List Price: $49)
Requires: 64K, one disk drive, PC-DOS.
SofTool Systems
8972 E. Hampden Ave.
Denver, CO 80231
(303) 793-0145

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A lot of time is spent writing codes to protect your information. Now it's time to protect your computer.

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Designed by

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820 East 47th B-10
Tucson, Arizona 85713

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Introducing PC/COM.™ Truly, the fastest, easiest way to manage information today.

When MOM™ says she has a software system that can manage information faster than anything else on the market, believe it.

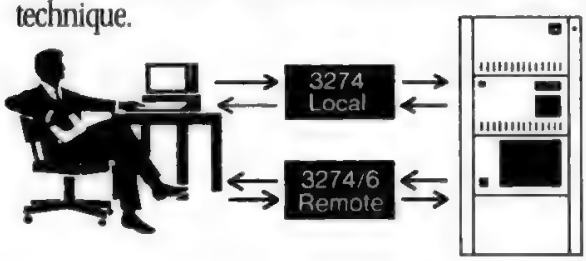
It's called PC/COM. A revolutionary automatic file transfer and management system that opens up a whole new realm of opportunities to PCs and PC-users.

Your mainframe works faster with PC/COM. Your PC gets more file management features.

If you are a mainframe user of TSO, CMS, or CICS, PC/COM will prove invaluable.

MOM says any job worth doing is worth doing fast.

MOM's PC/COM manages information at an incredible speed. And PC/COM will handle just about any file type with its unique binary transfer technique.

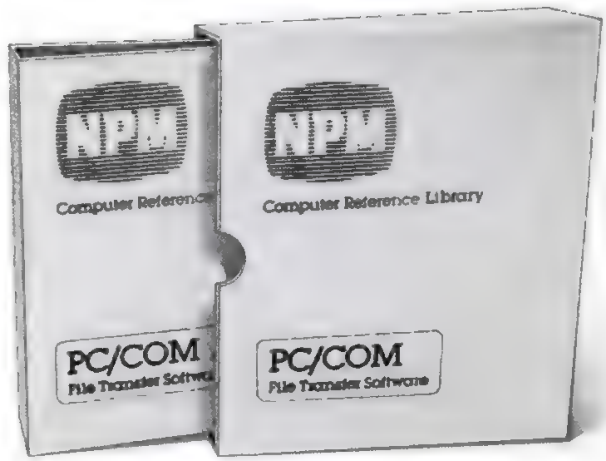


You can even back-up your hard disk on the mainframe. Leave it parked there until you need it. All it takes is the press of a key to get it moving again.

PC/COM is bi-directional, to save time getting information out of the mainframe onto your desk. And vice versa.

Security conscious, private and flexible — that's MOM.

The PC/COM has file access control and security built right in. So only those parts of the mainframe that should be accessed, are.



PC/COM is user-friendly and menu-driven so it's easy to understand. And simple to operate. All the features (and believe you, MOM, there are plenty) are initiated by a single function key.

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Talk to MOM. Tell her what you have and what you need. Ask her any questions about PC/COM and get good, clear answers.

MOM wants you to understand what you're getting into with PC/COM — and how much you can get out of owning the best, and fastest, file transfer and management system on the market.

The revolutionary PC/COM. Of course, from MOM.

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CIRCLE 805 ON READER SERVICE CARD

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Message Store & Forward System, Candela

Message Store & Forward System

A software-based telephone message store and forward system which can distribute messages and company-wide memos to departments and individuals. The system utilizes *CAN-PRINT* software to store up to 800 messages, which can be instantly recalled for any individual upon request.

The electronic store and forward system accepts messages of up to 220 characters each, which can be entered directly from a keyboard. Message recall is requested by entering an individual's name. The software can also search and display a directory listing if the exact name is not known.

Each message is automatically time-stamped by day, hour, and minute. Once delivered, the message is automatically printed out as a permanent record and erased from disk, ensuring availability of disk space for additional messages.

In addition to the *CAN-PRINT* software, Message Printers are available from the manufacturer, which produce hard copies of phone messages using thermal-printing techniques. The printers are the same size as desk-top printing calculators, and can be connected to the system via simple T-connectors to phone lines.

(List Price: CAN-PRINT $350; Message Printers: $160 each)

Requires: 128K, one 320K drive, PC-DOS, asynchronous communications port, Hayes Smartmodem 300 baud.

Candela Electronics
550 Del Ray Ave.
Sunnyvale, CA 94088
(408) 738-3800

CIRCLE 774 ON READER SERVICE CARD

OFFIX

A visual document preparation program that features pictoral displays guiding the user through the creation and retrieval of documents, files of documents, and "drawers" of files. The program integrates electronic filing functions, word processing, form design, and report generation.

The word processing function of *OFFIX* is capable of handling routine correspondence and documents up to 100 pages. System operators can create custom forms and document formats without programming knowledge. The *OFFIX* hierarchical filing system, translated into office terminology, consists of two file cabinets, each with three drawers. Each drawer can hold up to 100 file folders. A file folder may contain any number of documents or forms up to the capacity of one diskette.

OFFIX features three tiers of on-line user assistance: pop-up menus, Help screens, and documentation.

(List Price: $99)

Requires: 128K, two disk drives, PC-DOS.

Emerging Technology Consultants, Inc.
2031 Broadway
Boulder, CO 80302
(303) 447-9495

CIRCLE 780 ON READER SERVICE CARD

ACCESSORIES

Data Defender

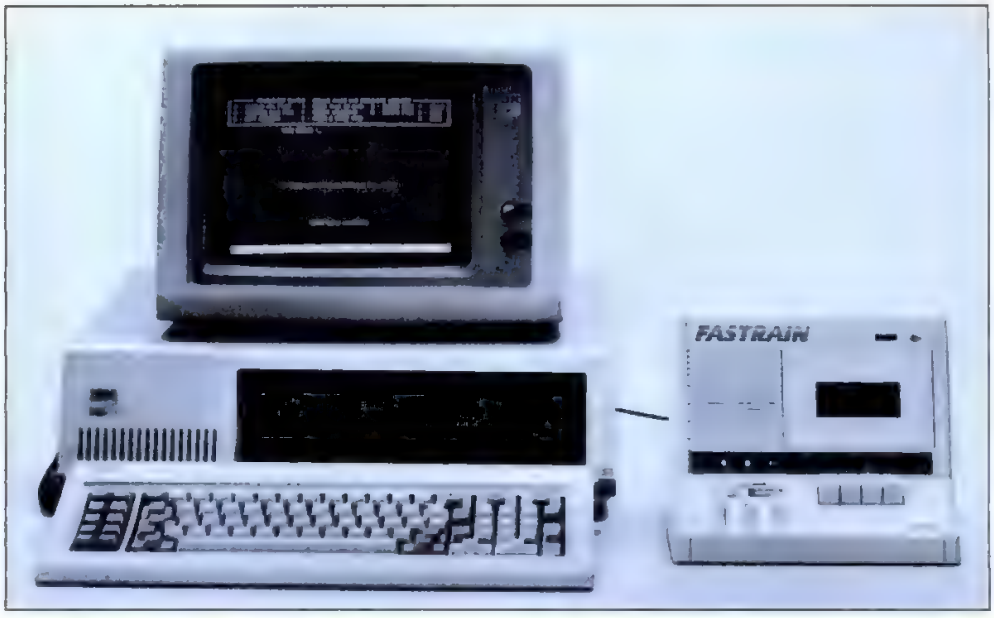
A digital burglar alarm consisting of a pressure sensitive mat, which is placed beneath the equipment to be protected, and a control module containing two 100-decibel horns. Plugging the control module into a standard 120 VAC outlet activates the device. A manual reset key switch permits only individuals with the proper key to turn off and reset the device.

The alarm is actuated by either the removal of equipment from the mat, or by any attempts to tamper with the wires that connect the mat to the module. In addition, battery back-up provides continuous protection for short periods during power outages.

As an added option, up to ten mats can be connected to a control module, allowing all of the separate components of a system to be protected on-site. The alarm can also be adapted to work with any 12 VDC home or office security systems.

(List Price: $189.95; additional mats each $21)
PICOtronics, Inc.
820 E. 47th St., #8-10
Tucson, AZ 85713
(602) 624-8771

CIRCLE 752 ON READER SERVICE CARD



FASTRAIN, Electronic Protection Devices

FASTRAIN

A training device consisting of a special-purpose cassette player that interfaces to a user's system, and instructional software. The cassette player and software combine to provide a tri-sensory approach to learning commercial software such as *WordStar*, *Multiplan*, and other programs. The audio tapes are keyed to the software simulation lessons to audibly reinforce the lessons presented on the user's screen. The tapes guide users through planned lessons, triggering screen displays which match those of the actual commercial software responses. Users can proceed at their own pace, and go back and review lessons as needed.

(List Price: FASTRAIN Cassette Player $498; Lesson Packages $149)
Electronic Protection Devices
54 Sun St.
Waltham, MA 02254
(800) 343-1813
(617) 891-6602

CIRCLE 753 ON READER SERVICE CARD

Telephone Line Switch

A selector switch permitting a user to switch any one of two modems to a common telephone line, or any one of two telephone lines to a common modem. The Model 8518-D A,B Selector Switch can interface to any two-wire DDD dial-up telephone network or any four-wire private line network. Both RJ11 and screw-type connectors are provided on the rear panel. The RJ11 jack is compatible with RJ11C, RJ13C, and RJ14C module plugs.

Connector points are wired in parallel, permitting either plug or screw-terminal connections at the A, B or C interface points. The device is available as a desktop unit, housed within a metal enclosure.

(List Price: $165)
International Data Sciences, Inc.
7 Wellington Rd.
Lincoln, RI 02865
(401) 333-6200
TWX: 710-384-1911

CIRCLE 743 ON READER SERVICE CARD

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8"	sin·side dbl·den.	4.45
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CIRCLE 179 ON READER SERVICE CARD

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5624 Girard Av. S. **612-866-9022**
Minneapolis, MN 55419

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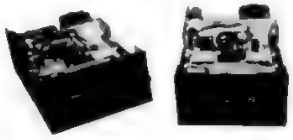

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A safe designed specifically to protect software diskettes from fire and humidity. The Media Safe, model 5750, has a shrouded dial for privacy while dialing, a 3-digit changeable combination, and four-inch live locking bolts with two dead bolts for added protection.

The units are fire-tested to withstand temperatures up to 1,700 degrees fahrenheit. The Media Safe weighs 230 pounds, and can store up to 80 5¼-inch or 40 8-inch diskettes. It measures 23¼ inches by 17½ inches by 23 inches, and includes a section for documentation.

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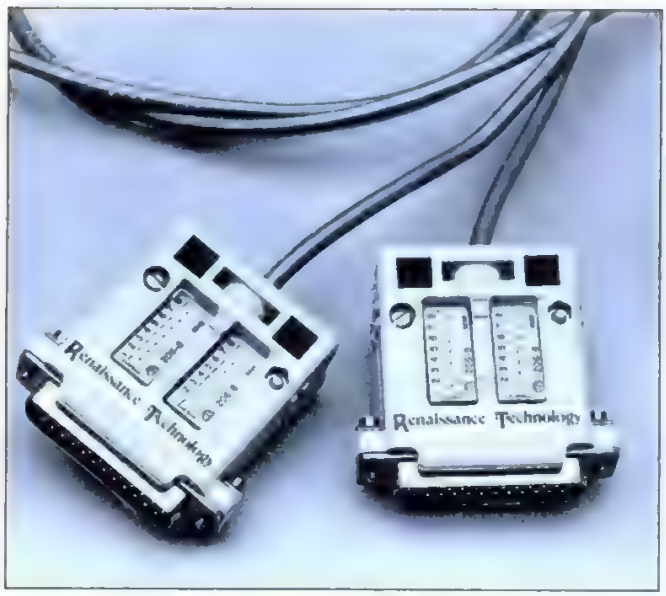

***Universal Serial Cable,** Renaissance Technology*

Universal Serial Cable

A cable providing interconnections between almost any two RS-232 serial devices. The serial devices can be interfaced by adjusting a set of DIP switches built into the cable's connectors. Once switches have been set, the cable is plugged in and used as a conventional cable.

Included with the Universal Serial Cable is a cross-reference chart of serial computers, printers, and peripherals, providing DIP switch settings for all interconnections.

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PUBLICATIONS

COBOL Coding Guide

A reference guide for programmers working in COBOL. The 46-page guide presents a set of standards and examples, providing a methodology for constructing programs that are structured, testable, and easily maintained. *($22)*
Associated Technology
Rt. 2, Box 448
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CIRCLE 738 ON READER SERVICE CARD

How To Get Started With MS-DOS

A non-technical guide to using the MS-DOS (PC-DOS) operating system, designed to aid the beginning user to understand and use the system effectively. The book, by Carl Townsend, covers a range of topics including why an operating system is needed, instructions on using its commands and utilities, and an explanation of how to do word processing.

The first part of the guide is a tutorial. Chapters include Who Needs An Operating System?; MS-DOS Overview; IBM Hardware; Your first MS-DOS Session; Files, Records and Disks; Using the Commands and Utilities; Back-up Procedures and Taking Care of Disks; Using the Line Editor; Word Processing With the IBM PC; and MS-DOS BASIC.

The second part of the book contains a series of appendices, including MS-DOS tables and maps, error messages, and commands; BASIC commands; a comparison of CP/M and MS-DOS; and a glossary.
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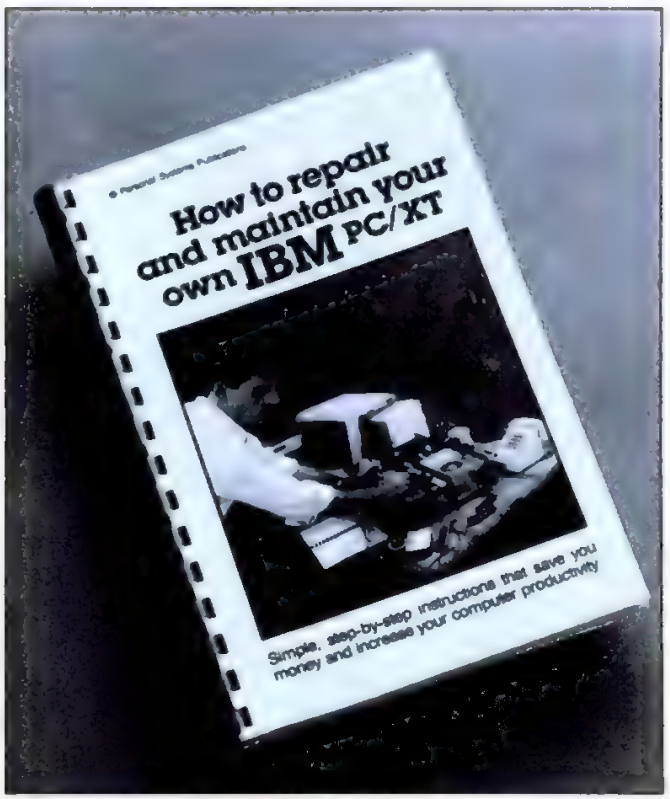
CIRCLE 737 ON READER SERVICE CARD

PC/XT Repair Guide

A repair manual for the PC/XT, providing both technical and non-technical users with step-by-step instructions and trouble-shooting tips. Covering a range of topics from simple repairs to the component level of the user's system, the 200-page guide allows the user to perform trouble-shooting tests using only a common volt-ohm-meter and logic probe.

The book, titled *How to Repair and Maintain Your Own IBM PC/XT*, also details repairs and trouble-shooting for the IBM PC. *($19.95)*



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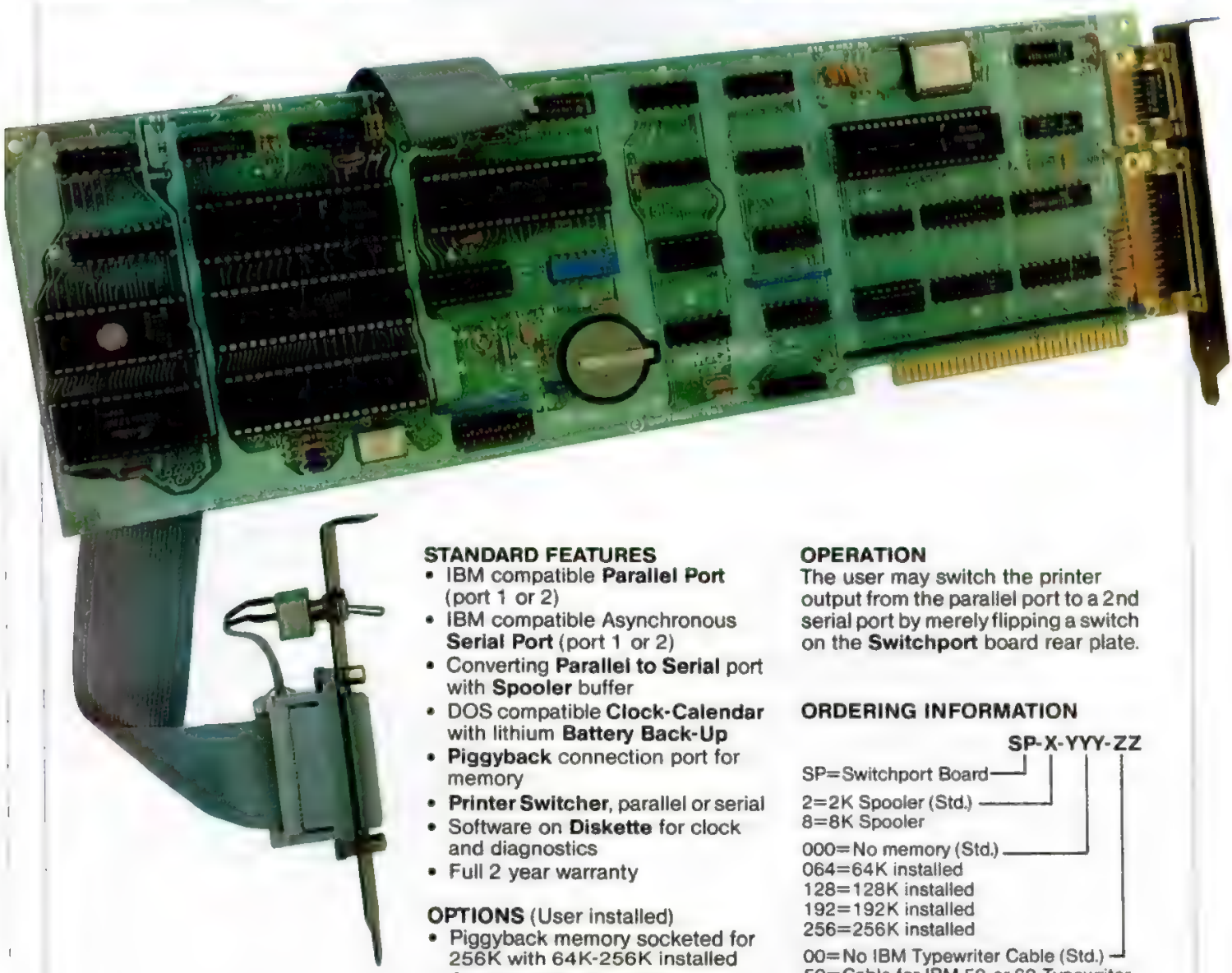

STANDARD FEATURES

- IBM compatible **Parallel Port** (port 1 or 2)
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- Converting **Parallel to Serial** port with **Spooler** buffer
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The user may switch the printer output from the parallel port to a 2nd serial port by merely flipping a switch on the **Switchport** board rear plate.

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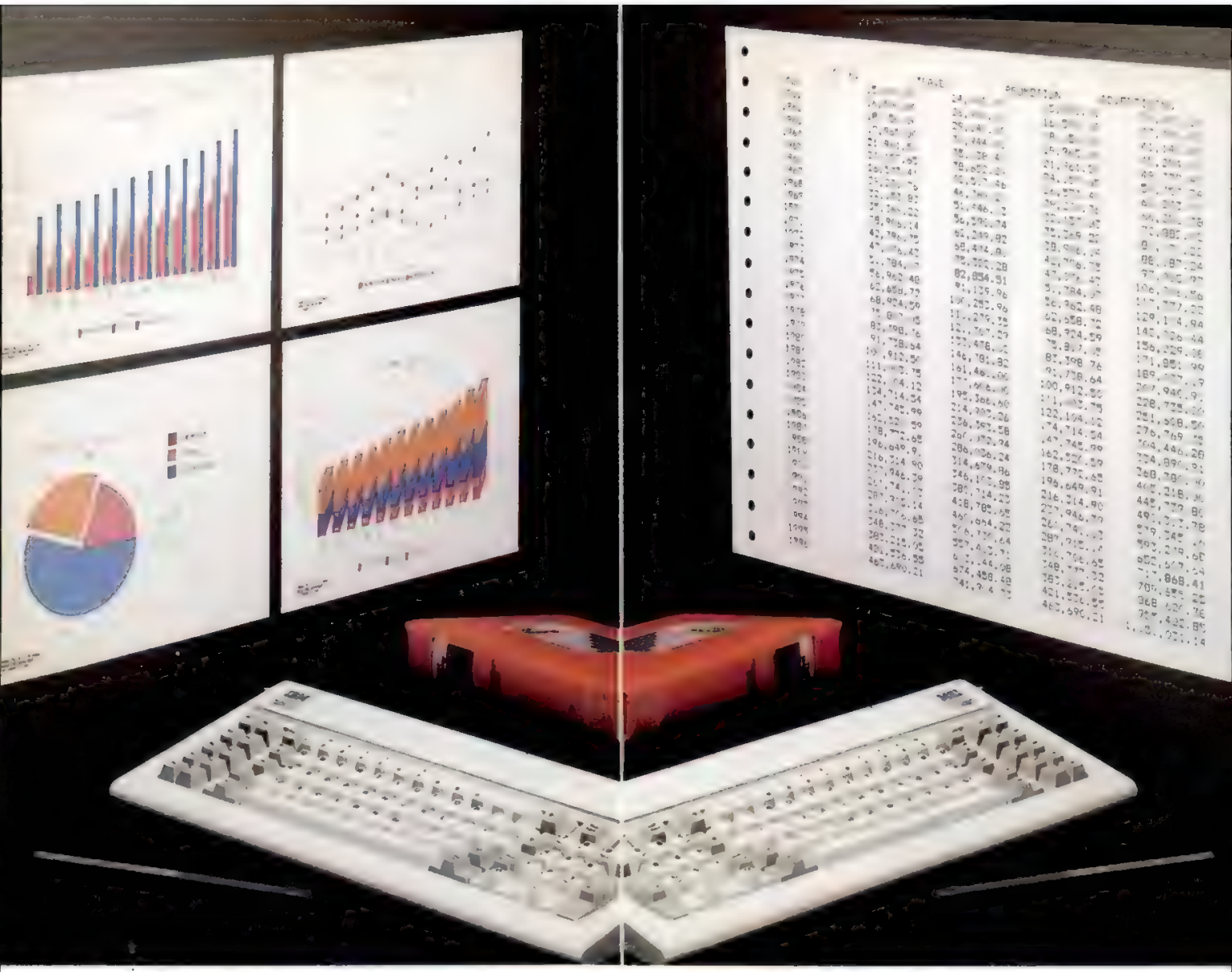

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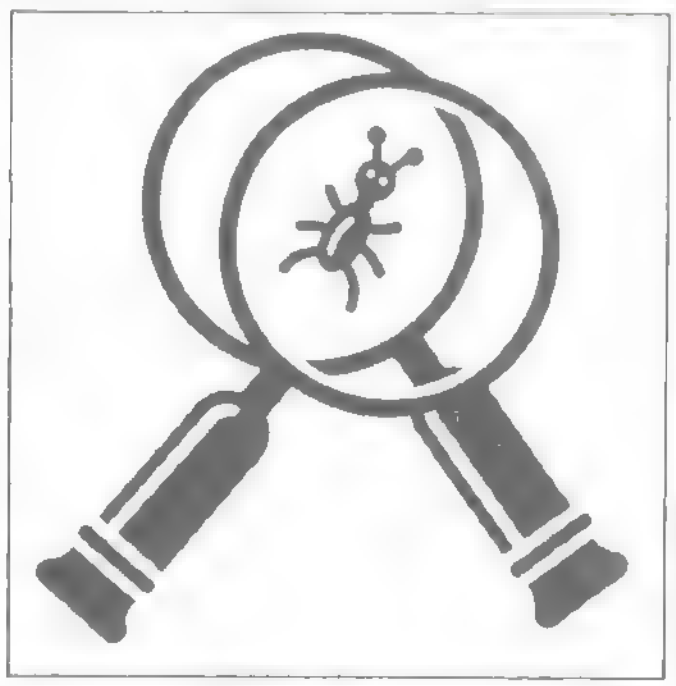
EDITED BY PAUL SOMERSON

User-to-User

PC readers help one another by passing along their persistent problems, inspired comments and helpful solutions.



Protection Scheme

Here are two programs that may be of some use to anyone with DOS 2.0. The PROT.COM program produced by PROT.BAS (see Figure 1) will make any file read-only, so that it cannot be removed with ERASE or DEL and cannot be OPENed from BASIC. UNPROT.BAS (see Figure 2) creates a program called UNPROT.COM that will turn it back to normal, so that it can be erased.

Doug Lankshear
Vancouver, BC

These work quite well, but only on .COM and .EXE files. They'll protect BASIC files also, but they'll do it so well you won't be able to run them. You will, however, be able to run any .COM or .EXE file you've protected; you just won't be able to remove it from your disk.

To use these programs, you must first run the accompanying BASIC programs to create PROT.COM and UNPROT.COM. To ensure protection of your CHKDSK file, for instance, at the DOS A) prompt, enter:

PROT CHKDSK.COM

To test whether or not it has worked, first enter DIR and you'll see CHKDSK.COM in the directory. Enter CHKDSK and you'll see the usual disk and memory status report. But try to kill the file with a DEL or an ERASE and all you'll get is a "File not found" message. You can unprotect this file just by entering:

UNPROT CHKDSK.COM

This works by putting a "1" in byte 11 of the file's directory listing, or adding 1 to the value already there. You can read more about this attribute byte in Appendix C of the DOS 2.0 manual—it's also how DOS knows whether a file is a hidden file or a system file, or has already been backed up.

Back From the Dead

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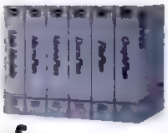

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Authoritative

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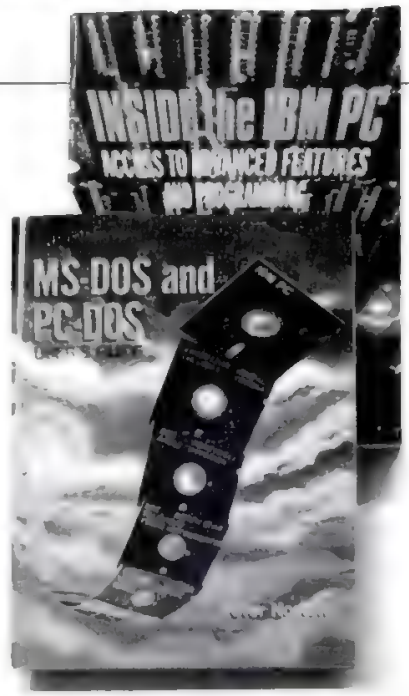
With handholding examples and explanations of MS-DOS, Peter Norton includes chapters on Fundamentals of DOS Commands, Getting the Most of DOS Editing Keys, What You Need to Know about Diskettes and File Formats Programming Languages, Batch Files, and Copy Protection. Norton gives expert advice on copy protection and software selection. For both the novice and the expert, he provides a glossary and a summary of commands for easy reference.

Peter Norton has earned his reputation as the authority on the IBM PC resulting from years in the field, articles in major magazines, lectures, interviews and consulting work. The expertise gleaned by Norton appears within the pages of his two books and benefits the reader and his PC.



"MS-DOS and PC-DOS: User's Guide"
Peter Norton 1983/250pp/paper/ISBN 0-89303-645-5/D6455-2/$15.95

"Inside the IBM PC"
Peter Norton 1983/320pp/paper/ISBN 0-89303-556-4/D5564-2/$19.95
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The book that has become the final companion to the machine, "Inside the IBM PC: Access to Advanced Features and Programming" illuminates the inner workings of the machine while demonstrating how both beginning and advanced programmers can take advantage of the many features offered by the PC. Norton also explains how the ROM is allocated for BASIC and BIOS. He explores the RAM for functions like the monochrome and color monitor displays and shows how the assembler can be integrated into Pascal and BASIC to access more power from the IBM PC.

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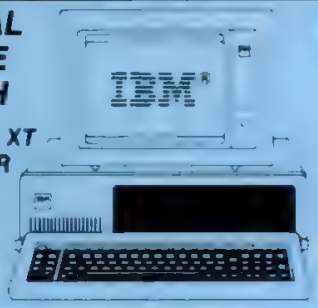

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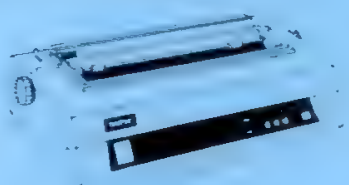

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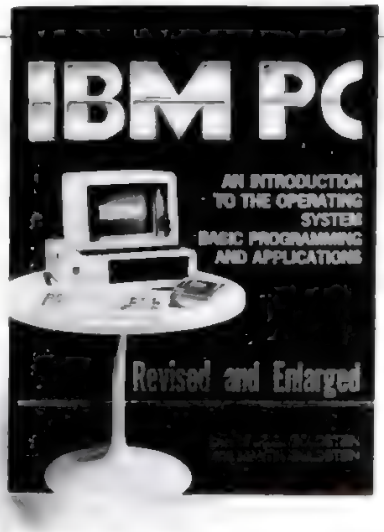
The author, Dr. Larry Joel Goldstein, is presently a professor of mathematics at the University of Maryland at College Park. Involved in the design and application of computers since 1958, Goldstein is known for his straightforward writing style which makes learning technical subjects easier for thousands of readers. Co-author Martin Goldstein is currently the president of Goldstein Associates, a consulting firm in West Palm Beach, Florida.

Dr. Goldstein has proven to be a prolific author, having written many books and created specialty software for the computer. And, the professor has won numerous awards for his teaching. That teaching glitters in all of his efforts.



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Larry Joel Goldstein, Martin Goldstein 1984 392pp ISBN 0-89303-530-0 D5300-1 $17.95

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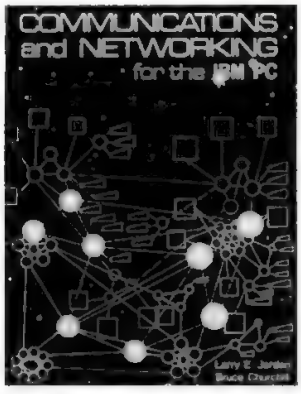

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```
100 ' PROT.BAS (DOS 2.0) -- makes files read-only -- by Doug Lankshear
110 Y=0
120 FOR I=1 TO 80:READ X:Y=Y+X:NEXT I
130 IF Y=6958 THEN GOTO 190
140 PRINT "Error in data statements"
150 PRINT "Correct and restart"
160 END
170 '
180 '
190 RESTORE
200 OPEN "PROT.COM" FOR OUTPUT AS #1
210 FOR I=1 TO 80
220 READ X
230 PRINT#1,CHR$(X);
240 NEXT I
250 END
260 '
270 '
280 DATA    190,   128,     0,   254,     4,   138,    28,   136
290 DATA      0,   184,     0,    67,   185,     0,     0,   186
300 DATA    130,     0,   205,    33,    60,     2,   117,    10
310 DATA    180,     9,   186,    48,     1,   205,    33,   235
320 DATA      9,   144,   128,   201,     1,   184,     1,    67
330 DATA    205,    33,   195,     0,     0,     0,     0,     0
340 DATA     66,    97,   100,    32,   112,    97,   116,   104
350 DATA    110,    97,   109,   101,    32,   111,   114,    32
360 DATA    102,   105,   108,   101,    32,   110,   111,   116
370 DATA     32,   102,   111,   117,   110,   100,    13,    36
```

Figure 1: *The PROT.BAS program that produces PROT.COM*

```
100 ' UNPROT.BAS (DOS 2.0) -- restores files to normal -- by Doug Lankshear
110 Y=0
120 FOR I=1 TO 80:READ X:Y=Y+X:NEXT I
130 IF Y=7235 THEN GOTO 190
140 PRINT "Error in data statements"
150 PRINT "Correct and restart"
160 END
170 '
180 '
190 RESTORE
200 OPEN "UNPROT.COM" FOR OUTPUT AS #1
210 FOR I=1 TO 80
220 READ X
230 PRINT#1,CHR$(X);
240 NEXT I
250 END
260 '
270 '
280 DATA    190,   128,     0,   254,     4,   138,    28,   136
290 DATA      0,   184,     0,    67,   185,     0,     0,   186
300 DATA    130,     0,   205,    33,    60,     2,   117,    10
310 DATA    180,     9,   186,    48,     1,   205,    33,   235
320 DATA      9,   144,   128,   225,   254,   184,     1,    67
330 DATA    205,    33,   195,     0,     0,     0,     0,     0
340 DATA     66,    97,   100,    32,   112,    97,   116,   104
350 DATA    110,    97,   109,   101,    32,   111,   114,    32
360 DATA    102,   105,   108,   101,    32,   110,   111,   116
370 DATA     32,   102,   111,   117,   110,   100,    13,    36
```

Figure 2: *UNPROT.BAS produces UNPROT.COM that restores files to normal*

dawns on you that you forgot to save the first?

I have a solution to retrieve your original program, or at least one screenful of it. Here's the procedure:

> Do not erase or change the obliterated lines! If you do, your cursor will disappear and you will crash . . .

1. Immediately after erasing your unsaved program, type in the following command:

```
PRINT CHR$(14) (and hit Enter)
```

This will display a musical note.

2. Hit the up arrow key (on the 8 key) twice to get on the same line as the musical note.

3. Hit the insert button. Type in: 10 then press the space bar.

4. Hold down the ALT button and hit the letter P.

5. Release ALT and type in a double quote (").

6. Hit the Enter key. Your line should now read:

```
10 PRINT''♫
```

7. Type in: RUN and hit enter to run this one line program. The musical note should appear on the screen.

8. Type in LIST, and lo and behold, your erased program should scroll down at you.

Try this by loading a program you already have copied on a disk, then typing in NEW. Make sure the program is longer than two or three lines, because this recovery process will obliterate the initial two program lines. However, these are usually REMs or standard setup lines anyway.

However, DON'T ERASE OR CHANGE THOSE TWO OBLITERATED LINES! If you do, your cursor will disappear for a few seconds and you'll crash into BASIC's opening screen and hang. The only way out is a reboot. The way to capture this listing is to fill your screen with the recovered listing, type: NEW, move up to the first non-obliterated line, and keep hitting the Enter key until your cursor moves to the line that says NEW.

Terrific. This works perfectly for short programs. Unfortunately, you'll lose most of the longer ones. What I do if I'm feeling nervous is an old John Schnell trick—make the first line of the program:

```
10 SAVE ''FILENAME.BAS''
```

where the real name of the program is substituted for "FILENAME.BAS" This will save the program every time I run it to test whether it's working. It's especially handy when working with a program that contains a NEW at the end or loads and runs another program.

Share Your Discoveries

Tell the world about your latest discovery through User-to-User. You'll encourage others to return the favor, and we'll pay you $25 for your trouble. Please use double spacing when writing for this department. Mail your contributions to: User-to-User, *PC Magazine*, One Park Avenue, New York, NY 10016.

Note: In the interest of accuracy, we will accept—even encourage—submissions containing program listings on a disk. *PC* will return or replace a disk at your request. If you send a disk, please include a printout of your submission to ensure against damage in transit.

Furthermore, all programs that create .COM or BSAVE'd executable code from decimal or hex data must be accompanied by the source code in assembly language. This, too, will reduce errors and will be instructive to readers of User-to-User. ■

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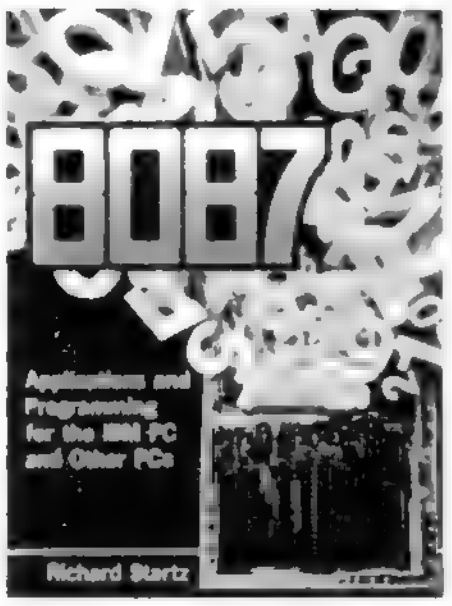

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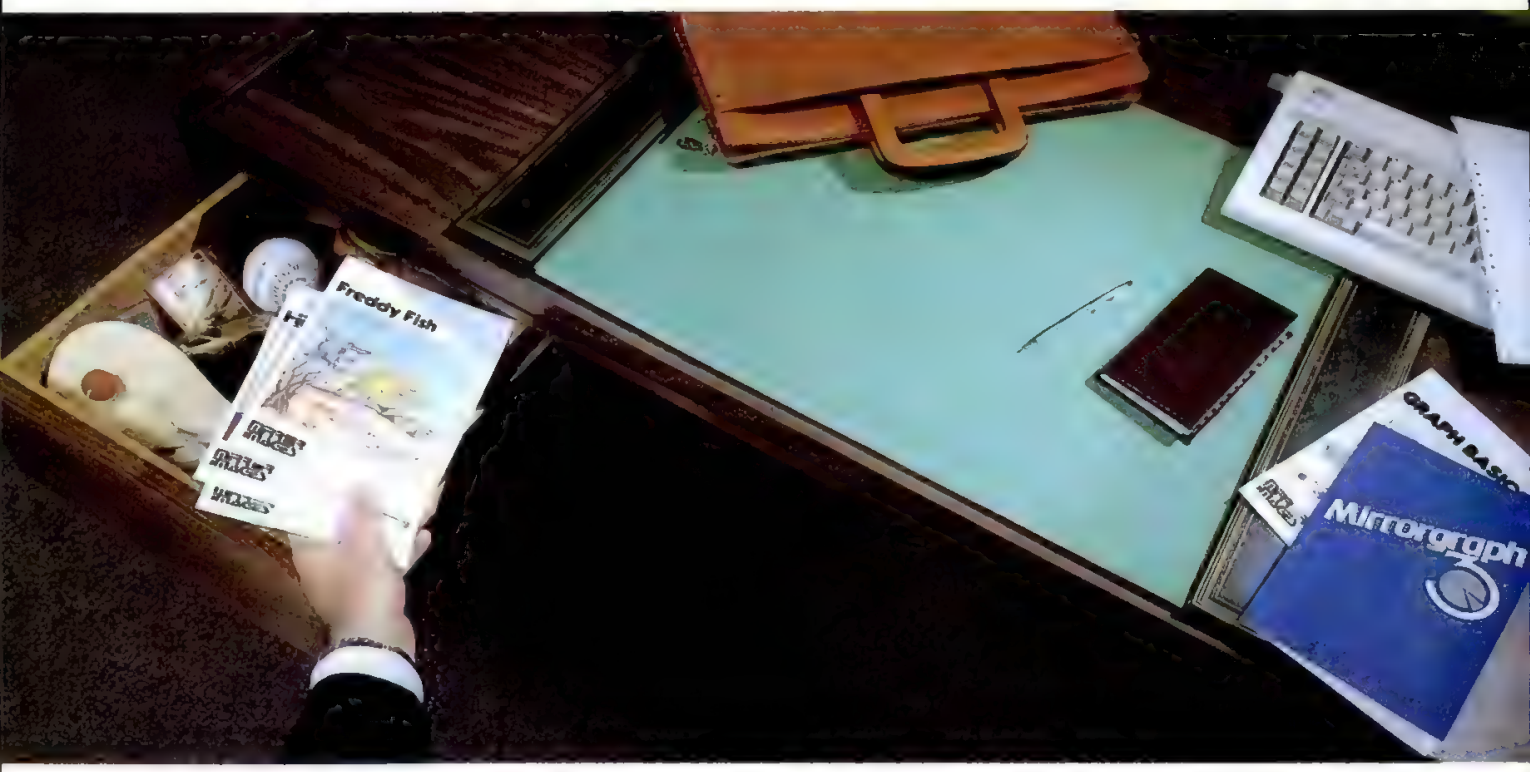

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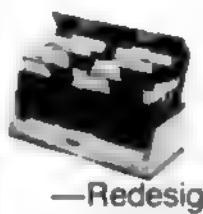

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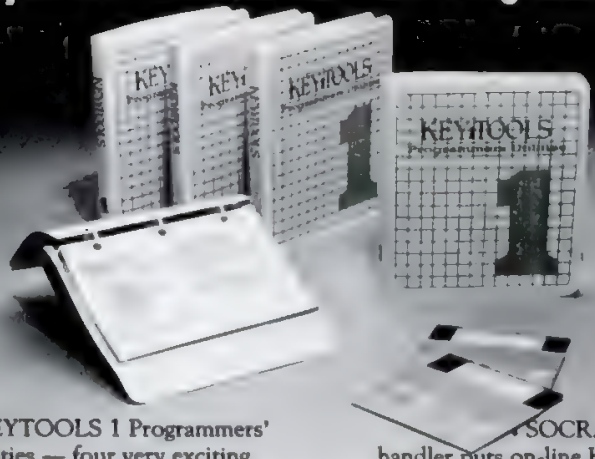

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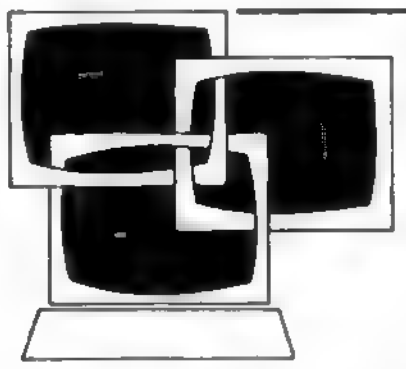

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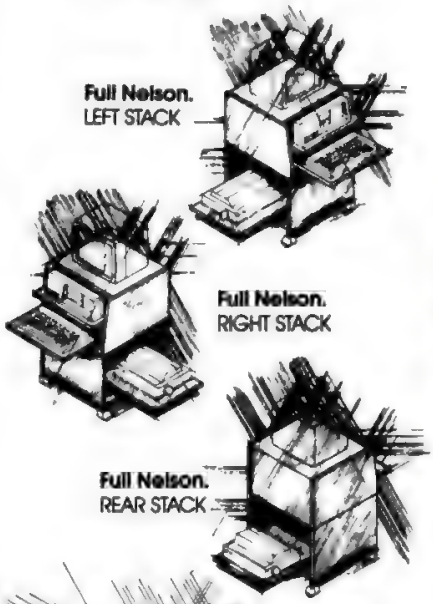

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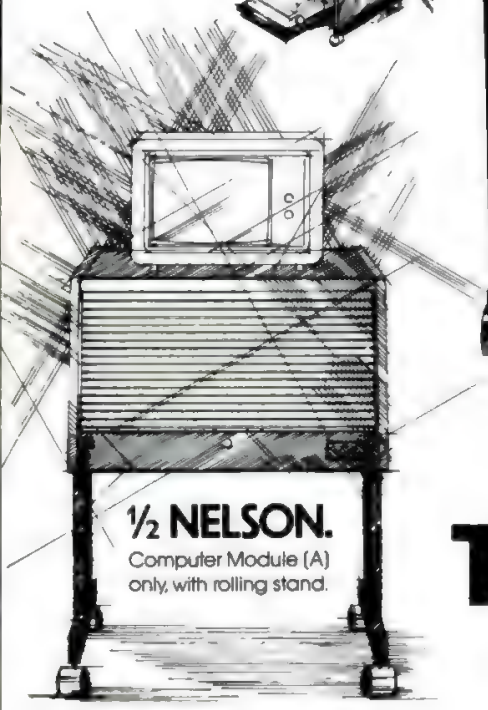

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PC Tutor

The EOF Function

Q: I write most of my programs in BASICA and I have had trouble with the EOF (end of file) command. Every time I have tried to use the EOF command with sequential files I get an "Input past end" error when I run the program. I have even tried running the example in the IBM BASIC manual and I got the same error. Is there any way to avoid the "Input past end" error?

Gary DiBianco
Chappaqua, New York

A: *The EOF function is not a command, at all. It is not like the ON KEY commands that work automatically. It is more like a DEF FN* function. *In order for the EOF to work, you must call it each time before doing an INPUT during the loop. It will return true as the value if all of the file has been read, and a value of false if not. Take a look at this routine, which is much like the example you tried from IBM's manual:*

```
10 OPEN "CON" FOR INPUT AS #1
20 IF (EOF(1)) THEN END
30 A$ = INPUT$(1, #1)
40 PRINT A$;
50 GOTO 20
```

This will echo lines of input until you type a Ctrl-Z to indicate the end of console input. Then the program will END. Note that if you change line 50 to say "GOTO 30", you will get an "Input past end" error. As long as you check the EOF condition before performing an INPUT statement, you should have no trouble.

By the way, although it is easy to open "CON" by the method used in this example, you should avoid doing so in real programs. This method appears to confuse the BASICA interpreter. You'll see the problem if you try hitting a bunch of line feeds with the KEY display ON.

Monstrous Models

Q: Do you know of anyone who has developed a linear programming model for the IBM PC that is capable of handling in excess of 1,000 variables and 1,000 constraints?

K. A. Cover
San Francisco, California

A: *To handle that much data you would need to use a revised simplex method. I found it quite easy to write such a routine in APL. However, the magnitude you are talking about would require about 8 megabytes of data, and cause consider-*

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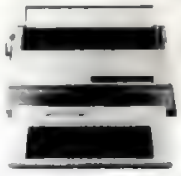

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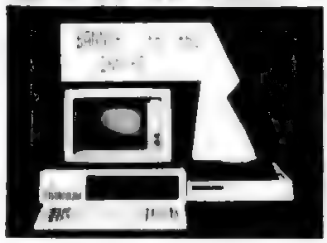

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able maintenance problems.

For these needs, I think you would be better off using a virtual memory machine, such as the SAGE 68000 computer that has a floating point processor. The PC is not really up to such a task, since even a mediocre implementation of the revised simplex would require a substantial amount of disk I/O and you could expect the solution to take about a full day to run. If your model has sparsity (lots of zeroes) it may be conceivable to run it on a PC, but the programming complexity is substantial. My preference would be to use a VAX/730 or 750.

For a discussion of large problems, take a look at Optimization Theory For Large Systems *by Leon Lasdon, published by MacMillan in 1970.*

Vectors Revisited

Q: I would like to make a suggestion concerning your answer regarding trapping a Ctrl-C in BASIC. (See "Disabled Break" on page 72 of *PC*, Volume 2 Number 2.) Here's how you can reset the interrupt vector that is called from the keyboard routine when Ctrl-C is typed (see page 3-21 of the *Technical Reference Manual*):

```
10 REM Reset Ctrl-C Break
Vector
20 DEF SEG=0
30 POKE &h6C,&h53 : POKE
&h6D,&hFF
40 POKE &h6E,0 : POKE
&h6F,&hF0
```

John M. Sullivan
Cambridge, Massachusetts

A: *Although the program you specified will work on the IBM PC, let me discuss why I originally gave this answer:*

```
10 REM This works with BASIC
2.0
20 KEY 15,CHR$(4)+CHR$(70)
30 REM Now KEY(15) is Ctrl-
Break
40 REM and it can be trapped
```

It differs from your program in the following two important ways.

First, my answer was completely hardware independent. Since BASIC 2.0 is specified to work that way, you can redefine the key wih any computer with the same keyboard that runs DOS 2.0 and BASIC 2.0. Thus, the subroutine I gave before works on far more machines, and with guaranteed operation.

Second, your routine assumes that the user will find an IRET instruction at location F000:FF53. While that may be true for current PCs, there is no guarantee that the BIOS ROM will not change in the future. In fact, some of the instructions on the XT's BIOS ROM and on the 256K PC's ROM differ from the 64K PC's ROM. My previous answer, however, is guaranteed to work with all versions of the PC that run BASIC 2.0.

This approach also has the advantage of allowing you to call a subroutine by asynchronously trapping a Ctrl-Break whenever the keys are pressed, rather than waiting until the BASIC program reads input via INKEY.

You can at least increase the odds somewhat by using the vector located with respect to INT 1Ch (the "get control on timer" interrupt). Since it is initialized to be an IRET, and since it should be harmless even if used by a program as a timer or as a task switcher, that approach will work on future and current PCs. The following is a simple BASIC program that will copy the vector.

```
10 REM Copy INT 1Ch vector to
20 REM keyboard break.
30 DEF SEG=0
40 FOR I=0 TO 3
50 POKE (&h6C+I),PEEK
(&h70+I)
60 NEXT I
70 REM Now Ctrl-Break acts
like a
80 REM user's time interrupt,
90 REM which is normally an
IRET.
```

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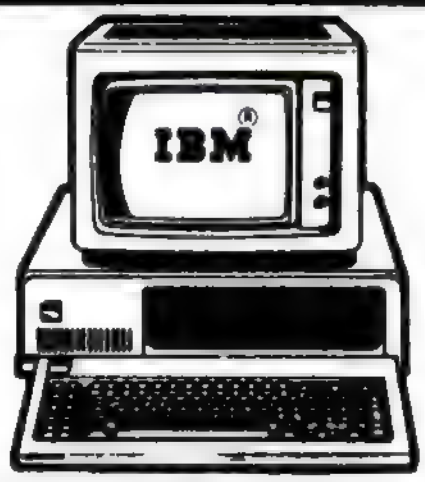

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PC TUTOR

BASIC that I hope to sell. The program is not compiled, so the program disk must include PC-DOS.

To avoid infringing IBM's copyright, my program disk contains a batch file that will copy files from the user's PC-DOS disk (COMMAND.COM and BASICA.COM) onto the program disk.

My batch file also tries—without success—to transfer the IBMDOS.COM and IBMBIOS.COM files. If I format the program disk without the /S option, I get a "No room for system on destination disk" error when the batch file attempts a SYS transfer. If I use the /S option, I can't use the ERASE command afterwards to delete the hidden files, which I must do to avoid copyright infringement.

I want to know whether these two hidden files can be included on my program disk without copyright infringement. If not, is there any way to copy these files from my customer's copy of PC-DOS?

D.L. Buschek
Akron, Ohio

A: *First of all, the fact that your program is not compiled has nothing to do with whether a copy of DOS is needed on the diskette. It does mean that the BASICA interpreter is required to run the program.*

The PC's disk operating system (DOS) consists of three files: COMMAND.COM, IBMDOS.COM and IBMBIOS.COM. When PC-DOS is loaded, the IBMBIOS and IBMDOS files are loaded permanently into memory. At that point, the system disk may be removed from the machine. It is not required again until you reboot.

You have to include the PC-DOS files with a program disk only if you want a user to be able to automatically run your program simply by inserting your disk before turning on the machine. Otherwise, the instructions you supply with your program could include a statement such as, "First, you should insert a disk containing the DOS system and turn on the computer."

The COMMAND.COM program is loaded semi-permanently into the machine. It needs to be present on the disk only if your program takes up enough space in the PC's memory to overlay where the COMMAND file was stored. Even if overlay does occur while using your program, when it finishes, PC-DOS will display a message to tell the user that the COMMAND.COM file cannot be found, and advise him to insert a disk containing that file.

Thus, you don't really need to have the PC-DOS system files located on your program disk at all. You do need the BASICA.COM file, since your program is not compiled, but you've found there's no difficulty COPYing that file from a PC-DOS disk.

If you want the startup process to be automatic (using the AUTOEXEC.BAT option), which would be simpler for the user, there is a way to leave room for the PC-DOS files. As you suspected, your using the /S option of FORMAT to put the system files on your program diskette would infringe on IBM's copyright. The ERASE command does not clear all the sectors of a file, just the pointers to the file. I believe that selling a disk with the IBMBIOS.COM and IBMDOS.COM files erased from it would still infringe on IBM's copyright.

In this case, PC-DOS 2.0 can come to the rescue. With it, you can use the /B option of FORMAT to leave space for the system files. Take a look at page 6-100 of the DOS 2.0 manual. The /B option will also produce a disk that is compatible with all versions of PC-DOS. Your program disk would still need a batch program that will run the SYS program and transfer COMMAND.COM and BASICA.COM onto your customer's disk.

The PC Tutor solves practical problems and explains points of general interest. If you'd like to see your questions answered here, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016.

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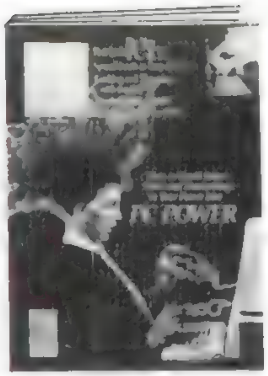

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FORTRAN: Not Just For Scientists

Though FORTRAN rivals Pascal and Ada in structure, the language still allows for the writing of quick and dirty programs.

In the article, "Grandfather FORTRAN," which appeared in this column in the last issue of *PC*, I talked about FORTRAN's entry into the microcomputer world and discussed some of its programming features. As you recall, this language allows for structured programming, just as Pascal and Ada do.

While programming experts would prefer to have a language require strict programming practices, such structured languages as Pascal, Ada, and PL/I tend to be too cumbersome for small programs. At the same time, these constraints are welcome and needed when large complicated programs are created, debugged, and later modified. FORTRAN allows both types of programming and requires the programmer to know when to use each. In addition, the future version of FORTRAN will provide further structural capabilities that will enhance its ability to provide clear and precise code. FORTRAN will then rival Pascal and Ada in structure, but it will still allow "quick and dirty" programs to be written.

Another ease-of-programming feature offered by FORTRAN is its ability to allow a program to be broken into separately compiled subroutines. All of the information passed between the main program and a subroutine, or between two subroutines, is tightly controlled through Call statement arguments (for example, CALL TIME (HRS, MIN, SEC)) or Common Blocks (for example, COMMON /BLOCK1/ HRS, MIN, SEC).

Unlike BASIC, this is the only way variables are shared between calling and called routines. This allows a programmer to debug his program in easily understandable blocks and to assemble those blocks into the final program with the linker. A change in one block does not require that the whole program be recompiled, which prevents you from wasting time. The FORTRAN programmer can then create a "library" of already debugged and compiled subroutines to be used in new programs.

FORTRAN's popularity is well estab-

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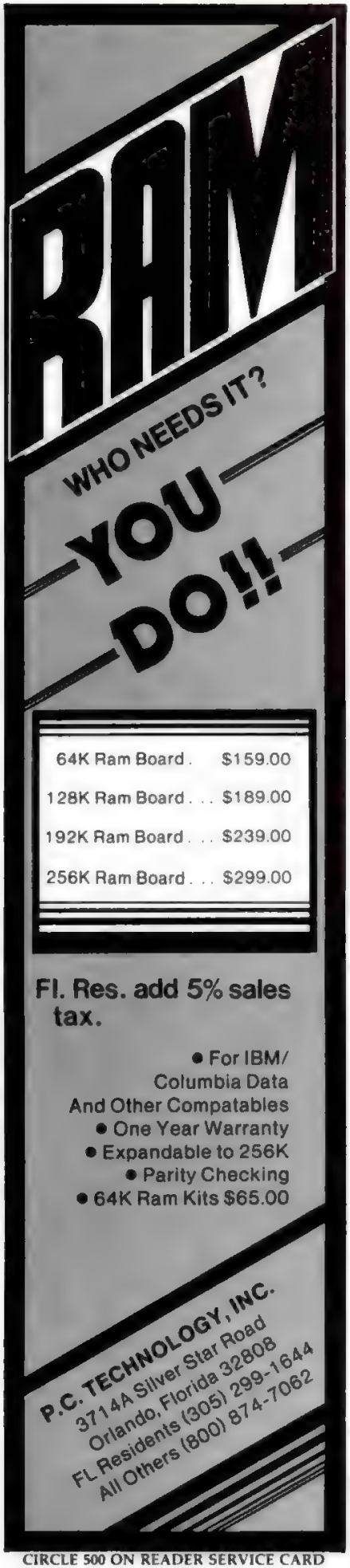

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lished. You rarely hear the argument that a programming language is good because it is popular, but popularity should be a factor. A good computer program, like a good novel, is more valuable if it can be used and understood in more than one place. Rarely is a program transportable among different computers if the language used is not supported on both computers. Even when the same languages are supported, if they are not standardized versions, one must be wary of differences. One of FORTRAN's outstanding features is that it is so standardized that it is available for many different computers—it is one of the most transportable languages available.

FORTRAN subroutine libraries that contain proven solutions to many problems exist in the public domain and are for sale. IMSL, Inc. (NBC Bldg., 6th Floor, 7500 Bellaire Blvd., Houston, TX 77036) is planning to offer a subset of its over 500 FORTRAN subroutines for use on microcomputers. Also, at your local college library, you'll find a huge pool of FORTRAN programs and solutions for almost any field of computing.

FORTRAN is an efficient and powerful language. There seem to be some standard features necessary in any general programming language. The ability to manipulate high-precision numbers quickly will provide the speed and accuracy required for many business and scientific/engineering applications. The ability to perform string/character operations makes word processing and report generating programs practical. The ability to program in separate modules for later combination with more complex programs greatly increases the power of the programmer to organize and develop sophisticated applications. A language that fails to provide these requirements as standard has limited use. The better implementations of FORTRAN contain all of these features.

But why not use the popular Pascal? While it is an International Standards Organization (ISO) language, the standard itself is not very complete. Standard Pascal does not support such important features as exponentiation, double-precision real numbers, complex arithmetic, or modular programming. Although IBM Pascal has exponentiation and modular programming, there is no assurance the IBM enhancements will conform to a future Pascal standard. The "power" that FORTRAN lacks, when compared to Pascal, is the ability to directly access the memory or operating system. If the POKE- and PEEK-type commands are important to you, FORTRAN may not be for you. However, the ability of a FORTRAN program to incorporate subroutines written in Assembly language, or even in languages such as Pascal, provides an alternate means for those who wish to access the most primitive parts of the computer.

FORTRAN Compilers

The ability to use any language depends upon the availability of good compilers/interpreters. New FORTRAN compilers are now appearing for the PC, and each one seems to be better than the last. While so far none has the full power of the FORTRAN 77 standard, before long one that does should appear. The IBM PC, with its large addressable memory space and the 8087 numeric coprocessor, is one of the first micros that could fully support such a compiler. Four of the available computers are looked at here.

IBM FORTRAN Version 1.0 is an unfortunate choice. At last count there were 45 pages of patches for known errors in this compiler. If you own IBM's FORTRAN 1.0, you can get a patched update from your dealer.

This compiler lacks double-precision real numbers and uses a real-number format that is incompatible with the 8087 numeric coprocessor. While it supports a subset of the FORTRAN 77 standard, it has some serious omissions, such as the lack of list-directed I/O for easy communications from the keyboard to the program. It also poorly documents the compiler defaults. Many users are unaware that the

compiler generates up to two-thirds more code than necessary. It is hard to understand why the originator of FORTRAN would put out such a poor product.

The FORTRAN for the UCSD P-Code system operates under the UCSD system, which is not the *defacto* standard for the IBM PC. UCSD FORTRAN incurs an efficiency penalty by compiling only to a P-code level. This P-code must then be interpreted at run time, just as it is in interpretive BASIC. However, if you use the UCSD system, this is the compiler for you.

Supersoft FORTRAN IV Extended (Version 1.04) could be the most efficient FORTRAN compiler available for the IBM PC. In tests, its programs run two to three times faster (when an 8087 is not used), than those of the IBM or Microsoft versions. The compiler has double-precision real numbers and complex numbers. (Complex numbers are very powerful tools for solving problems in areas such as electrical engineering.) It uses the IEEE real-number format, and an optional package can be purchased to access the 8087 coprocessor. Also provided is an assortment of useful subroutines, which allow a FORTRAN program to access the operating system and maintain control of the screen.

Unfortunately, like the IBM BASIC and Pascal compilers, the Supersoft FORTRAN IV compiler limits the amount of data space to 64K. This includes all common data (shared between subroutines), local variables (only used inside a subroutine), format definition statements (for input and output), the stack (for transfer of data between subroutines), and the heap (file control blocks). Even for moderate-sized programs, 64K can be a limitation. In addition, the commonly used 4-byte integer is not allowed. I was told by Dale Jurich, the author of the Supersoft FORTRAN IV Compiler, that future revisions will correct these problems.

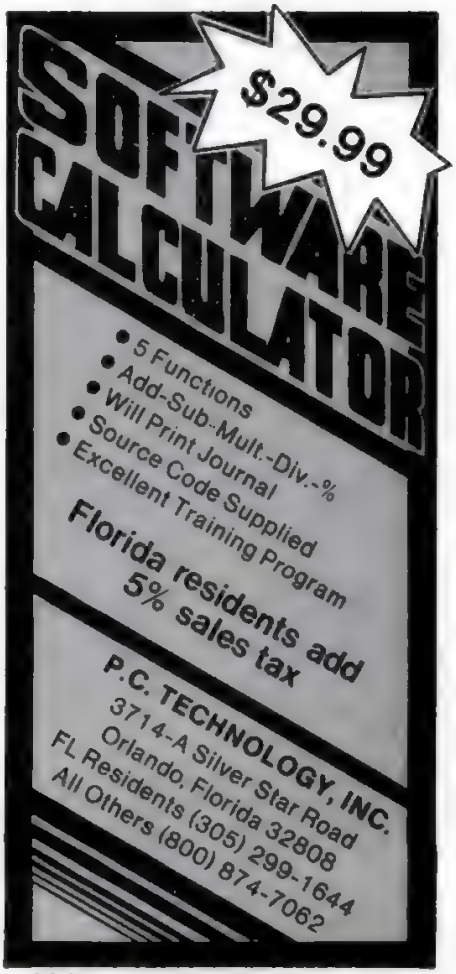
But probably the most serious problem is that it is not close to a standard FORTRAN. While it calls itself a FORTRAN IV(66), it has included some but not all of the FORTRAN 77 enhancements. FORTRAN 77 features, such as character data, are manipulated with subroutine calls rather than with the standard operators. The interactive list-directed I/O and error handling are also non-77 standard.

Microsoft's FORTRAN 77 Version 3.1 has a language structure very similar to the one offered by the original IBM FORTRAN compiler. It even retains many of the same metacommands for control of the compiler options. If you have developed a program for the IBM version, it should compile almost immediately with MS-FORTRAN 3.1. What makes this one different from the IBM version is that this one works. Microsoft has not only fixed the errors of the IBM FORTRAN compiler, but provided much more.

It now allows double-precision real numbers, uses the IEEE floating-point number format, and allows access to the 8087 coprocessor. A large program took 1.5 hours to run using code produced by the Microsoft compiler; when the same program was run on a PC with an 8087, the running time was 6 minutes!

Microsoft's compiler still seems to produce inefficient code compared to the Supersoft version, at least without use of the 8087. It also does not provide the FORTRAN 77 character operators. This puts a penalty on those programs that do a lot of text manipulation. And the FORTRAN manual needs better explanations of the error messages (as do most other manuals). However, this is a very workable compiler. Perhaps, when the microcomputer world discovers it, Microsoft will be encouraged to provide further improvements such as the character operators.

These days, FORTRAN is no longer just a language for scientists. It is easy to learn and should be attractive to nonprofessionals moving up from BASIC. If you choose FORTRAN, you will be using an efficient and powerful language that will improve in the future without sacrificing the hard-won lessons of the past. ■



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Extending The Reach Of Your PC

Learning to assemble and operate a communications program and modem can be a complicated and confusing task. Here are some pointers to help the communications novice get started.

Exciting things are happening in telecommunications. There's electronic mail, instant information retrieval, travel services, and more. The hang-up is that getting started can be confusing—even more confusing than getting started with computers initially. To say that it's easy to be overwhelmed is an understatement.

Of half a dozen people I know who bought a modem and communications program with their systems about 6 months ago, none has yet managed to get online. I have a feeling they're representative.

Generally with personal computers you only have to learn one thing at any given time: the particular program you're dealing with. In telecommunications you have to learn to use at least four things at once: a communications program, a modem, a communications network, and finally, the host computer that you're connected to. Depending on the circumstances, you may also have to learn how to hook up a modem to your computer on the one hand, and the phone line on the other.

Adding to the confusion is that, with few exceptions, modems and terminal programs come as separate packages. Instructions for either one can only talk about the other in the most general terms. You're left with the job of making the modem and software work together. Then there's the matter of signing on to and talking to the computer at the other end of the

phone line. If something goes wrong, it's almost impossible for a communications novice to figure out what the problem is, or even where to look for it.

In this article, I'll demonstrate one way to break this "systems integration" task into smaller, more manageable pieces. I'll also pinpoint places where you are most likely to have problems and show you how to deal with them.

Connecting Modem to Computer

First, there is the problem of connecting the modem to your PC. There are two choices. Either you have a modem-on-a-board or you have an external modem. The modem-on-a-board is easy. You slip it into a slot in your PC, and it automatically makes the right connections.

Connecting an external modem is more complicated. You have to have an RS-232 port on your PC. (The RS-232 port is an industry-wide standard for connecting computer equipment from different manufacturers.) The optional IBM communications card has an RS-232 port with a more-or-less standard connector called a DB-25. The DB-25 gets it's name, in part, from the fact that it has 25 pins on it. It is shaped like a "D" so you cannot plug it in the wrong way.

Virtually all external modes also use the DB-25 connector on their RS-232 ports. Some of these modems come with cables. Most do not. If you already have an appropriate cable, you can plug it in and forget it; otherwise you'll either have to put one together yourself or get one made up for you.

A word of warning: Most computers use a female DB-25 connector for their communications ports, which means that most modem cables are wired with a male connector at each end. If you happen to have one of these cables around, watch out. The female DB-25 connector on the IBM PC is *not* an RS-232 port. If you plug your modem into this, you may wind up with wisps of smoke rising from your valuable equipment.

The IBM communications card, and all third party communications cards that I know of, use a *male* DB-25 connector. This means that the cable to your modem

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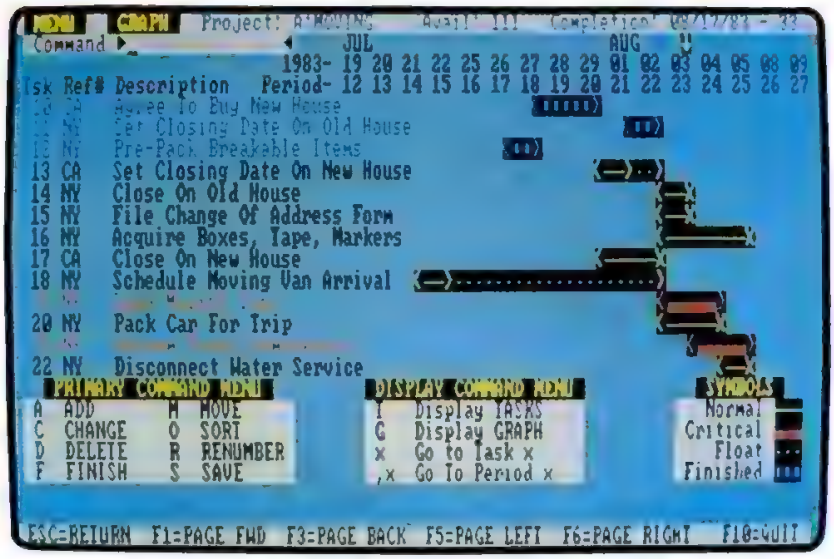

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has to have a male connector on one end and a female connector on the other.

As for the wiring itself, if you look head-on at a DB-25 connector, you will see that each of the pins or holes is numbered from 1 to 25. As a rule-of-thumb, your PC will work with most modems if you simply connect lines 2, 3, and 7 straight through from the computer to the modem. A cable that connects just these three lines will generally be cheaper than one that connects all 25 lines. Be aware, though, that there are some functions on some modems that won't work unless the other lines are connected as well. To play it safe, get a cable with all 25 lines connected.

One other complication: There are two standard ways to wire an RS-232 port. One requires lines 2 and 3 to run straight through from computer to modem. The other needs the two wires to be crossed, so that pin 2 on the modem is connected to pin 3 on the PC, and pin 3 on the modem is connected to pin 2 on the PC. Some communications cards and at least one modem include a switch or jumper that lets you cross or uncross lines 2 and 3 without rewiring the cable. If you have this capability, be sure to set everything to match the cabling.

Connecting Modem to Phone Line

When connecting the modem to the phone line, there are two possibilities: your modem is either direct connect or acoustically coupled.

Acoustically coupled modems communicate over phone lines the same way you do—by talking into the handset microphone and listening over its speaker. Each time you make a call, you connect the modem to the phone lines by putting the handset in the rubber cups of the modem.

Direct connect modems are permanently plugged into the phone system. There are some variations in approaches to how this is done. The details should be in your modem manual.

Virtually all direct connect modems

come with an appropriate cable to plug into the phone lines. In each case though, you need a phone with the newer, modular plugs. If you have the old-style phone jacks, you can find adapter cables at Radio Shack. If your phones are wired to the wall, you'll have to pay your local phone company to install the newer equipment.

Once you have your modem connected to the phone line, it makes little difference whether it is direct connect or acoustically coupled. Either way, establishing communications with another modem becomes a simple matter of turning your modem on in the appropriate mode at the appropriate time.

PC plus Modem plus Software

Before you actually go online, you want to make sure that your system is working as a unit. This means loading your software and testing it all out.

There are a few dozen terminal programs for the PC. These run the gamut from those that have very few features to those with every communications feature imaginable. My advice is to ignore the extras at first and do everything manually. There will be plenty of time to learn the more elegant features after you feel comfortable with using your modem and with being online. For now, there are only two things you have to know: how to set the baud rate and how to go into conversational mode.

Baud rate is a measure of speed. Your PC and your modem have to be talking at the same speed or else you will get nothing but garbage on your screen. If your modem is restricted to a single speed (300 baud or 1200 baud), set the terminal program to match. If you have a variable speed modem, set both to the same baud rate. (Setting the modem may be automatic or it may be controlled by mechanical or electronic switches.)

You're now ready to test the system. Put your terminal program into conversational mode. (Some programs call this "interactive mode.") All modems have some way to let you test the system. If you

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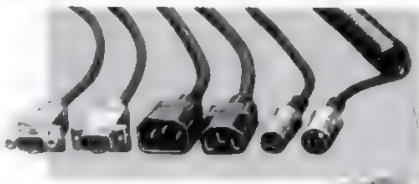

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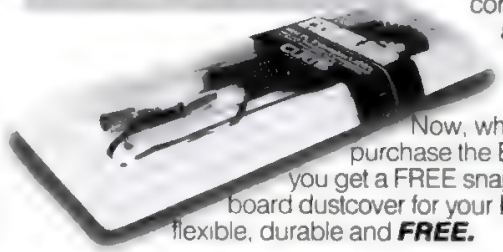

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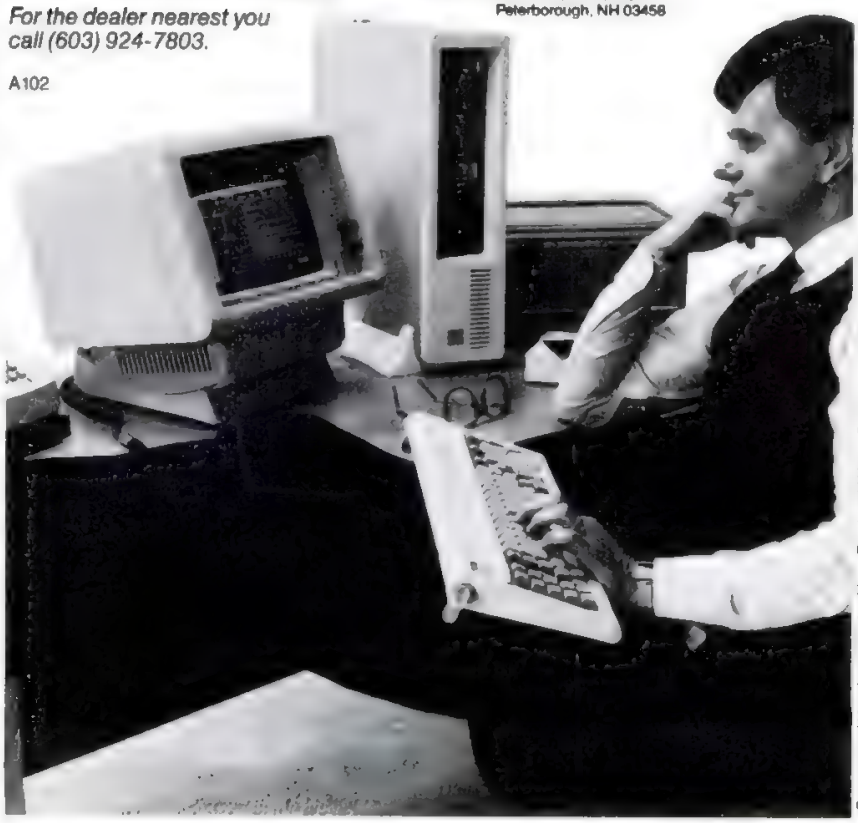

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TELECOMMUNICATIONS

have a Hayes Smartmodem, for example, all you have to do at this point is type:

```
AT <RETURN>
```

And the Smartmodem will respond with:

```
OK
```

Some direct modems have a test mode. When set for this, the modem "listens" to itself. Anything you type should show up on your screen.

Most acoustically coupled modems will let you do much the same thing. First, though, you have to create an acoustical pathway between the modem's speaker and microphone. You can do this easily enough by placing the handset in the modem and then dialing one digit on your phone to get rid of the dial tone. This will work until the phone company starts sending its "off hook" signal.

If Nothing Happens . . .

If nothing at all happens at this point, the most likely problem is your cable. Lines 2 and 3 may be crossed instead of running straight through, or your communications card or modem may be set to expect lines 2 and 3 to be crossed when they aren't.

If you get two characters on your screen for eeaacchh oonnee ttyyppeedd, your software is set for half duplex. Set it to full duplex and try again. If you get a string of undecipherable garbage on the screen, that means your PC and modem are not set to the same baud rate. Reset them and try again.

If everything works, your system is officially up and running, and you're ready to go online. Hurray! ■

M. David Stone is a free-lance science writer in Mount Vernon, New York. He is the author of two new books, Getting On-Line: A Guide To Accessing Computer Information Sources *and* Making the Most of WordStar *and* MailMerge; Things That MicroPro Never Told You.

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Putting A Stamp On Your Software

If you want to market your software, you'll need a name to distinguish them from all the programs in the marketplace. Here's a primer to help you select and register a trademark.

What's in a name? Ask any of the software companies advertising in *PC*, and they will probably respond, "Quite a bit." Each program advertised in this magazine bears a trademark that distinguishes it from all the others. A trademark is the commercial signature of the manufacturer, a symbol of its programming skill, and the focus of the goodwill that the company has established.

Trademarks serve two functions. First, they provide the trademark owner with protection against infringement. That is, if you apply a trademark to your software, the trademark will prevent a competitor from profiting from the good will that your business and your product have earned. Second, the trademark protects the consumer by guaranteeing that the particular program he is purchasing is, in fact, the product he believes it is, based on advertising and reputation.

If you've become skilled at writing programs on your PC, you may be thinking of marketing some of them. In this case, you'll want to come up with a proper trademark for your software company. Doing so is important, because, in addition to being commercially distinctive, a good trademark can create a positive impression in the minds of consumers.

Some companies spend millions of dollars selecting trademarks, but you don't have to. You do, however, need to make your selection carefully and bear in mind the legal principles covered in this column. To be safe and to provide clearance on the mark you select, it's a good idea to consult an attorney who specializes in trademarks. The trademark should be federally registered and properly maintained to prevent its loss.

The basic principle of trademark law is that no two products may have names so similar that they cause a "likelihood of confusion" in the minds of consumers.

But what constitutes "likelihood of confusion"? Generally, the term includes such factors as similarity in the sound, meaning, and appearance of the trademarks; the nature of the products, the marketing approaches; and the sophistication of the consumers to whom the products are directed. These factors are cumulative; in

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ISSUES

other words, similarity in only one or two of these categories probably would not constitute infringement of trademark.

Here is a fictitious example: The trademark Dynasoft, which designates a word processing program, might be likely to cause confusion with the trademark Dynsoft (another word processing program). In this case, "likelihood of confusion" results from the similarity in sound and appearance, identical purposes, the same general audience, and, most likely, similar marketing strategies. If Dynasoft referred to word processing software and Dynsoft was the mark for, say, a wall insulation product, they probably wouldn't cause a "likelihood of confusion" since the products, the purchasers, and the marketing plans would obviously be quite different from each other.

What happens when two related products are sold under trademarks that are not identical to each other, but close enough that they do, in fact, cause a likelihood of confusion? The common law rule, where there is no federal registration, is that the first company to use the mark has the superior trademark right, and that the second is infringing on the first.

If the two companies are geographically distant from each other,and the latter one adopted the mark without knowledge of the first, it is possible for the two marks to exist simultaneously. The legal rationale is that no likelihood of confusion would occur since purchasers reside in different geographic markets.

Federal Registration

However, this rationale does not apply if the first mark has been registered with the United States Patent and Trademark Office. Under the Lanham Act of 1946, federal registration is considered a national statement that the registrant is the owner of the trademark from the moment that the registration is issued. For instance, if a first user adopts a trademark in California and registers it federally, and a second user adopts the same mark on the same product in New York, even without

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ISSUES

knowledge of the first mark, innocent adoption of the mark is not a defense. In this case, the second user in New York infringes, and the California company can force it to discontinue use of the mark.

Thus, the federal trademark registration eliminates the good faith defense available to geographically remote users of the same mark. Federal registration provides nationwide exclusivity to a trademark. This is particularly important to software vendors that tend to market their products nationwide, rather than in a limited geographic area.

There are several additional advantages of federally registering your trademark.

- Federal registration allows you to use the federal court system.
- Federal registration serves as proof that the registrant is the owner of the trademark. Therefore, he does not have to prove ownership.
- After 5 years of continuous use of the mark, the registration becomes "incontestable" and is very difficult to defeat.
- The registration may be used to stop importation into the United States of software bearing an infringing trademark.
- The trademark can be identified as "federally registered," thereby helping to discourage cloning.

Unregistrable Trademarks

A trademark cannot be registered if it has been determined that it is confusingly similar to another previously used mark. Furthermore, certain types of marks cannot be registered under any circumstances. You cannot register marks that are immoral, deceptive, or scandalous; that falsely suggest a connection with any persons or institutions; or that include the name of another individual without his consent. You may not include the American flag or the flag of any country or municipality in your trademark. In addition, you may not use your surname or the name of a geographical area, except in the case where a mark has become well known to your customers or to those who buy similar products. To establish your mark as well

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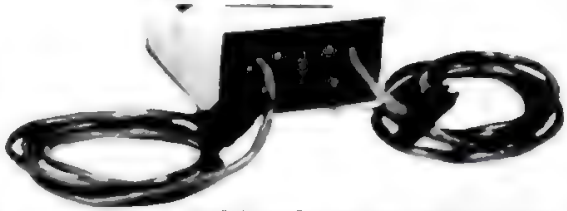

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ISSUES

known, you will have to provide evidence that proves notoriety. Another way to do this is to show that your trademark has been in continuous commercial use for at least 5 years.

Marks that are merely descriptive of the product, (for example, Mathprogram) or are misdescriptive (for example, Nonsoft) may not be registered unless you can prove they have become well known. The rationale for this rule is that a descriptive or misdescriptive mark does not function as a trademark, but rather as a description or misdescription of the goods.

Other marks are so descriptive that they are unacceptable. These marks are called generic, because they have become the common, rather than the brand name, of the product. Some names begin as bona fide trademarks, but, through improper use, become generic and lose their trademark status. Examples include *cellophane*, *thermos*, and *aspirin*.

It is doubtful, for instance, that the trademark "IBM" will ever become generic. If you use the IBM mark improperly, you will probably receive a letter from the company's attorneys.

Selecting Your Trademark

A mark that is arbitrary and distinctive is considered "strong" and will receive substantial protection by the courts. Marks such as EXXON and IBM, for example, will probably be considered by the courts to be so broad that virtually any unauthorized product carrying the EXXON or IBM mark will be an infringement of the registration. Marks that are descriptive, on the other hand, may be considered so "weak" that they provide virtually no protection at all. Between these extremes is a category labeled "suggestive" marks that literally suggest the function of the product. Here, trademark protection is narrower, but the suggestive mark may be easier to promote.

When you put your stamp on your software, strive to select a trademark that provides a good balance between a strong trademark and product enhancement. ■

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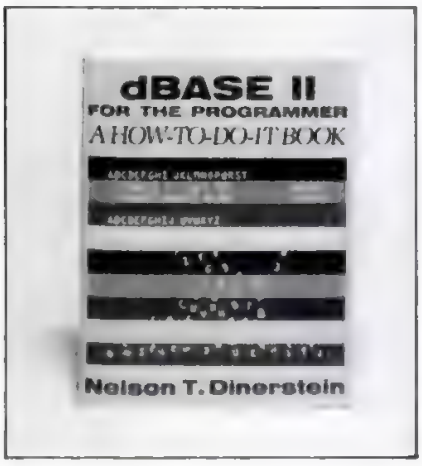

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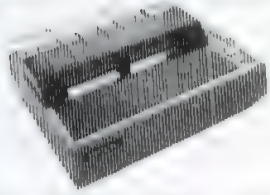

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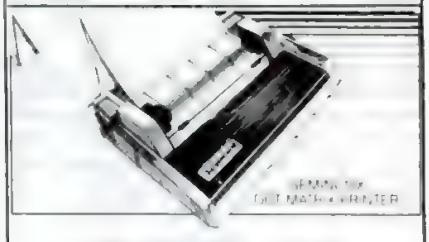

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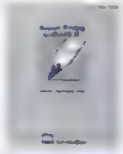

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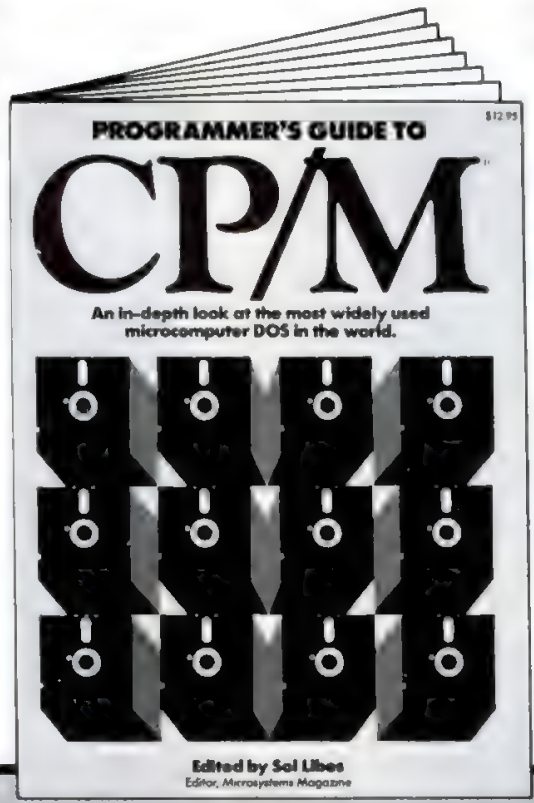

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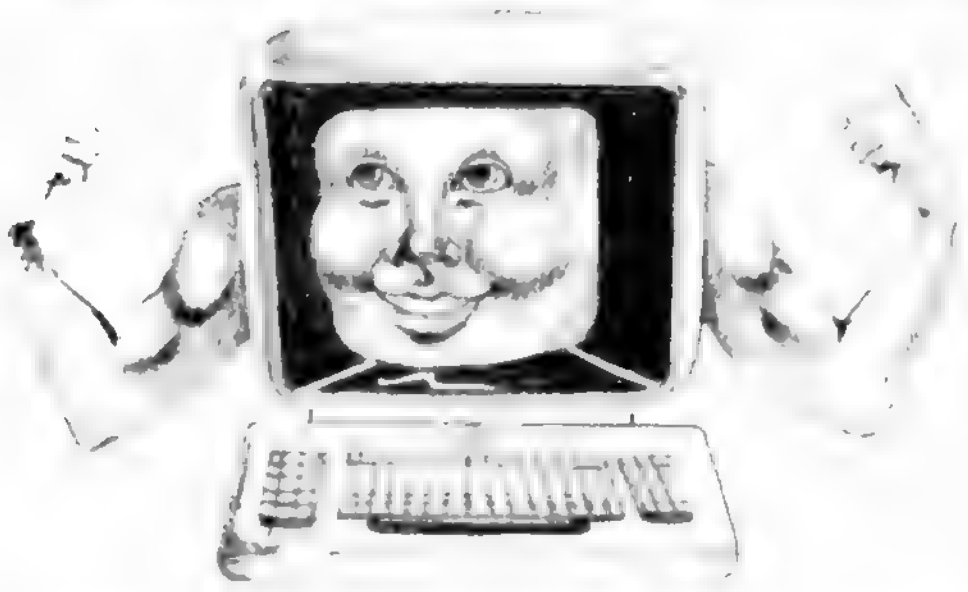

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Coming Up In PC

Apple and IBM

The PC steps into the ring with one of its most popular competitors. We'll look at how Apple led the way for IBM's PC, how the two companies differ in their use of BASIC and transfer programs, and how both are pushing for the educational market. In addition, there'll be an intensive examination of the differences between Apple's and IBM's philosophies and performance, and a careful peer into the future of each company.

User Review

Seequa's latest, "Chameleon," is a portable computer that lives up to its namesake: it changes its processor to match the environment of its application. Need CP/M-80 for an 8-bit machine? No problem. Have a 16-bit IBM PC? Piece of cake! The Chameleon can meet both needs.

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Radio Shack has come out with reasonably priced version of the popular ink-jet printer. *PC* will review this system.

Software for Screenwriters

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PIE Writer

We examine two new word processing packages: *PIE Writer* and *The Speller*, both from Hayden Software.

Columns

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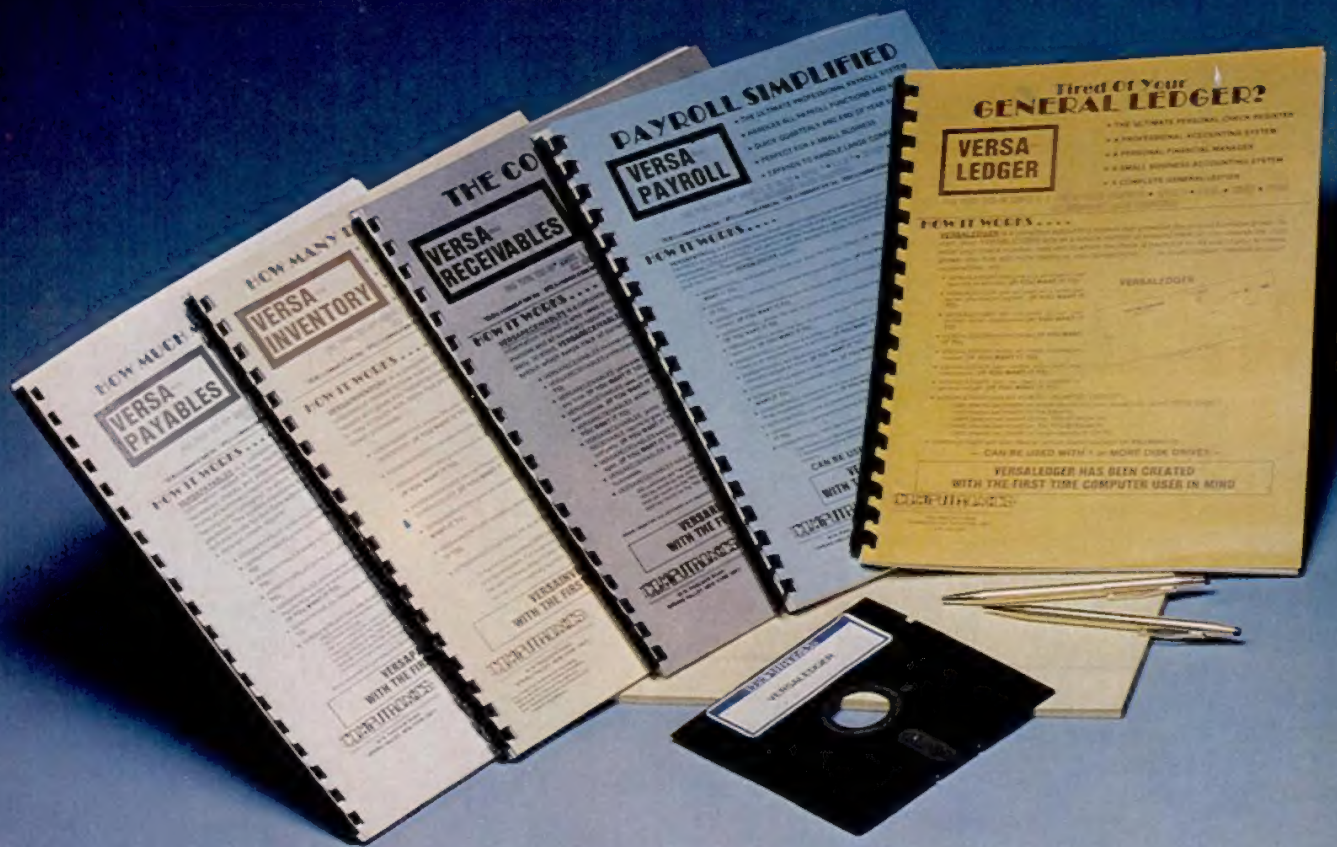

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